

CLEAN AIR

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The Ecologist

Journal of the Post Industrial Age

appears 10 times a year; it contains topical articles and reports on the major environmental problems facing the world today, together with critical analysis, ecopolitics, philosophy and practical suggestions for solutions from those engaged in the struggle to halt the spread of industrialism.

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CLEAN AIR

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THE COST OF CLEAN AIR

Everyone in any way concerned with the achievement of cleaner air is well aware that this has been done at some cost. The cost involved in bringing into operation smoke control areas has involved expenditure on the part of central Government, the local authority and the householder; and as the establishment of more smoke control areas continues to go ahead, albeit slowly, these costs continue. Similarly, the cost to industry has not been inconsiderable and operating costs are high. The price of clean fuels is also a factor of considerable importance and the recently announced increases in the prices of gas, electricity and oil highlight this.

Nevertheless, the vast majority of the people in this country consider that the cost of clean air has been well worthwhile and realise that the cost of the damage done by polluted air to health, amenity and materials was very much greater.

However, there is one other cost which must be taken into account and that is the cost of vigilance represented by contributions, financial and otherwise, made by its members to the upkeep of this Society. Rising costs and inflation affect the Society just like any household or business; and although the Society is a non-profit making charity, obviously it seeks to so conduct its affairs that its accounts come out on the right side and so enable it to build up small reserves against the inevitable "rainy day".

Looking at the Society's finances over the years, there have been some good years and some bad years. When there has been a bad year the prophets of doom have taken the line that unless something drastic is done, the Society will be unable to carry on: but when the Society has had a good year, then the sun is shining through the clean air and there is no need for any action to be taken!

Over the years the Society has sought to keep increases to the small subscriptions asked in line with the changes in the value of money to ensure that the Society has had enough funds, in real terms, to operate at a satisfactory level. But is this really enough? Surely the Society's subscription income should be such that it can expand. Last year, because of a number of factors which all came together at once, the Society had a good year and was able to transfer more money to reserve than has been the case in previous years. As a result, at the Annual General Meeting last July it was recommended by a majority verdict that the Society should not seek any mandatory increase in subscriptions for the year starting 1st April, 1980; this, in spite of the fact that the Honorary Treasurer warned that the budget forecast indicated that the next financial year would be likely to be a heavy one and it would be necessary to draw on reserves.

After very careful consideration the Council of the Society has accepted the position and decided that the official subscription shall remain the same as for last year. However, an appeal has already been made to the Society's major subscribers and it was felt that it would be only fair to make a similar appeal to every other member. This has been done by letter, but we would like to take this opportunity of pointing out that the major subscribers have responded extremely generously and it is hoped that every other member of the Society will follow their example and voluntarily increase their contribution to the Society to enable it not only to carry on its work, but also to extend its activities.

The Society is the country's clean air watchdog, especially now that the Clean Air Council is no more, but it cannot carry on its work properly unless it has the proper financial backing of every one of its members.

THE COAL MERCHANTS' ROLE IN CLEAN AIR

by F.J. FEELEY, LL.B., A.C.I.S.

Chief Solicitor, City of Glasgow District Council

A paper presented to the Seminar at Falkirk on 1st June, 1979,
for the Scottish Division of the National Society for Clean Air

The importance of clean air is well recognised both in health terms and in environmental terms. There is no doubt that the promotion of Smoke Control Orders by local authorities has considerably improved the health and well-being of the community and the Government have recognised this by continually exhorting local authorities to implement or complete their smoke control programmes.

However, the promotion of a Smoke Control Order does not itself make for clean air. That is just the start of the process. To achieve clean air it is necessary for individuals to comply with the law and refrain from burning bituminous coal in these areas. In terms of the Clean Air Act 1956 it is an offence to emit smoke in a Smoke Control Area and anyone who does so is liable to be fined. Accordingly, the residents in a Smoke Control Area have not only a role but also a legal duty in relation to clean air.

The 1956 Act made it an offence to emit smoke in a Smoke Control Area and the Clean Air Act 1968 provided for it to be an offence to sell unauthorised fuel in these areas. So at that time, the Government recognised the very important role played by the coal merchant so far as the environment is concerned and, generally, the majority of coal merchants have recognised that the law has imposed a duty on them and they have abided by the terms of the statute by refraining from selling bituminous coal in Smoke Control Areas. However, there is an increasing tendency for some merchants to disregard the law and go into Smoke Control Areas with the sole purpose of selling unauthorised fuel. Just as residents of an Area are liable to be fined for burning bituminous coal, so also are coal merchants liable to be fined for selling it in the area. The level of fines being imposed does not, however, seem to be very much of a deterrent since for the first time in many years the levels of smoke and sulphur dioxide in the atmosphere have risen and this would seem directly attributable to the burning of unauthorised fuel in Smoke Control Areas. Ideally, of course, the solution to the problem would be the imposition of more realistic fines but there seems to be a reluctance on the part of the courts to do so. The effect of the actions of these irresponsible merchants, who, it must be emphasised, are in a minority, is that many of the benefits of clean air are being nullified.

The benefits of clean air are many and varied, e.g.

- improved visibility,
- brighter colours being used,
- paintwork lasting longer,
- incentive to stone-clean impressive buildings

— and these are just the environmental advantages. The advantages in health terms are probably immeasurable. It is easy to appreciate, therefore, why it is so important that any

actions which might detract from these advantages must be opposed, and in the author's opinion the increase in the levels of smoke and sulphur dioxide in the atmosphere, already referred to, arises from such actions. The increase in levels is caused by people burning coal, much of it in Smoke Control Areas, and this, of course, is an offence. However, these people have been supplied with the coal by the merchants who are also breaking the law by selling in these areas. It seems obvious that strong action must now be taken to tackle the problem or the efforts of local authorities in promoting the Smoke Control Orders will have gone for nothing.

The role of the coal merchant in tackling the problem is of paramount importance because if he abides by the law it becomes much more difficult for people to get supplies. However, it is idealistic to suppose that all the members of any particular trade or profession always abide strictly to the letter of the law. Accordingly, it becomes necessary for society to introduce controls over the activities of people who break the law, specifically, offending coal merchants. This is in no way to condone the action of the other offenders, namely the people who break the law by burning unauthorised fuels. However, the problem should be tackled at source i.e. the supplier: using the analogy of the drug addict and the "pusher", it is much easier to solve the problem by eliminating the "pusher".

As far as controls are concerned, as explained, the Clean Air Act 1968 lays down a penalty which may be imposed, but generally the levels of fines being imposed are illusory and act as no deterrent.

Most coal merchants are members of the Approved Coal Merchants Scheme which is not a control body as such but is a consumer protection organisation. However, the Scheme does have the power to terminate a merchant's membership which theoretically should mean that he does not get supplies, but there have been instances where membership has been terminated but supplies have continued. It is obvious that the Scheme requires more teeth: this is difficult since it is subject to restrictive trade practices controls.

Before discussing a possible solution to the problem, it is appropriate to explain why it is in the interests of the good coal merchant to accept stricter controls. In the first place, the public generally wish to have the improved amenities which clean air brings and, if there is a lessening of the standard which we have enjoyed up till now, there could very well be a tendency to transfer to alternative fuels e.g. gas, oil and electricity. Secondly, there could be an upswing in the present trend to provide houses without flues. Thirdly and probably most importantly, it should be borne in mind that local authorities probably provide more houses in Scotland than the private sector, especially when one considers the massive modernisation and rehabilitation programme presently being undertaken, and these same authorities are responsible for promoting clean air. If the present tendency to break the law by selling bituminous coal in Smoke Control Areas, thus nullifying the potential advantages of clean air, is not countered, local authorities may very well give serious consideration to limiting their tenants' choice of heating.

It would be highly undesirable for the interest of the good merchant to be harmed in any way; solid fuel has an important part to play in the overall energy policy of the country. Equally undesirable is the situation where an individual's choice of fuel is restricted by his being provided with a house without a flue. However, nothing should be

allowed to continue which either detracts from the environment or could prove harmful to health, and the actions of the irresponsible coal merchants who sell coal in Smoke Control Areas come into these categories.

The solution proposed for the stricter control of merchants can be summed up in one word — Licensing. This proposal does not find favour in some quarters because it is looked upon as an unnecessary interference in trading activities. However, it is a means of enabling the merchants to comply with their role in clean air and it would probably be a case where the end would justify the means. The main reason for suggesting a system of licensing is that the present sanctions against offending merchants are inadequate, whereas in a licensing system there is the ultimate sanction of withdrawal of the licence and with it withdrawal of the right to trade.

The proposed licensing scheme can be summarised as follows:—

1. No merchant would be allowed to trade without a licence.
2. The licensing authority would be the District Licensing Board for the area in which the merchant's principal place of business is located — the Board is a quasi-judicial body.
3. The granting of a licence would not restrict the merchant to trading in that area — any such restrictions would be unreasonable and harsh.
4. Licences would be renewable on a yearly basis.
5. A nominal fee of, say, £5 would be payable on application and renewal — this system is not envisaged as being a means of making money for the Board, and accordingly, the fee should merely cover administration expenses.
6. An applicant for a licence would be required to be a member of the Approved Coal Merchants Scheme — this is essential in view of the Scheme's expertise in dealing with the practical aspects of the coal trade.
7. All convictions would be reported to the Board when they were considering an application for renewal of the licence.
8. The Licensing Board could withdraw the licence which effectively would withdraw the merchant's right to trade — this, of course, is the ultimate sanction.
9. If the licence were withdrawn, the merchant would have a right of appeal to the Sheriff — a right of appeal is essential to any licensing system.

In conclusion, clean air is important and coal merchants have a very great role to play in ensuring the success of clean air. The weakness of the present system has been indicated and it is suggested that, while a licensing system might not wholly obviate the present problems, it would minimise them, and it would be in the best interests of the trade to support the proposals. There are many businesses which require licences and they do not find the condition onerous. For the coal trade, the introduction of a licensing scheme could only operate to the best advantage of the majority of merchants who carry out their business in a lawful manner. It is a minority of merchants who are breaking the rules; the author might be accused of trying to legislate for the exception. However, it is argued that the minority are doing substantial harm and that the proposals are therefore merited.

THE COAL MERCHANTS' ROLE IN CLEAN AIR

A paper presented to the Seminar at Falkirk on 1st June, 1979, for the
Scottish Division of the National Society for Clean Air

by R.V. MORTON

Member of Executive Committee of the Coal Merchants' Association of Scotland

COAL MERCHANTS ASSOCIATION

The Association sets out to safeguard and advance the general interest of its members and of the solid fuel trade. The principal way in which it does this is by presenting a united front of what in all honesty is a loosely-knit association of traders, primarily in negotiations with the two big nationalised industries which feature so prominently in its members' business lives, the National Coal Board and British Rail. Similarly, although it happens far less frequently, the Association presents itself as being representative of the trade in negotiations with Government Departments, local authorities and the Trade Unions. Quite specifically the Association is charged with promoting and securing the effective operation of the Approved Coal Merchants Scheme and it does of course have two retail representative members on the Scotland Panel. The Association also undertakes to advise members to co-operate with local authorities in the implementation of the Clean Air Act and help ensure that suitable solid smokeless fuels are available for supply in Smoke Control Areas. And finally, one of its 16 or so objects requires the Association to watch over, oppose or promote legislation affecting the trade and to watch over the actions of, among others, local and public authorities which may be under duty to administer any Act of Parliament.

The Association, while it will produce a policy to meet the need of a particular situation in more general terms, is not normally a policy-making body.

Nowhere in the Articles of Association is there mention of a disciplinary procedure; in fact reading through the Articles it would appear that apart from leaving the Trade or not paying the Association's levy (which is almost impossible), once in membership, there is no way out. And just as with the Approved Coal Merchants Scheme the Association is not a law enforcement agency, nor would it ever want to be. Although it could be said that the Approved Coal Merchants Scheme provides our disciplinary code, it is unlikely that the ultimate Sanction of the Scheme would ever be other than the withdrawal of membership.

IMPLEMENTATION OF CLEAN AIR ACT

Therefore, it is official Association policy to advise members and co-operate with local authorities in the implementation of the Clean Air Act, within the make-up and the limitations already described.

It might be argued that this is not good enough as there are still serious problem areas where coal merchants quite blatantly ignore the requirements of the Act by selling

bituminous coal in Smoke Control Areas. These people are of no value whatever to the Trade and their actions are a means to their own selfish ends. But who has the power to put an end to this illegal trade? The Clean Air Act was introduced for the good of us all and that the penalties for breaches of the Act should be in themselves sufficient deterrent. If this is so, what has gone wrong? It seems that the law is not being applied stringently enough, and, from a layman's viewpoint the breakdowns appear to occur in differing places.

Looking first at an area such as Glasgow, where no-one could deny that Clean Air has transformed the City and where active and enthusiastic steps are taken to enforce the law, the illegal sale and consequently the illegal use of bituminous fuels is on the increase. Offending vendors are brought before the courts, some with alarming regularity, only to be fined petty sums which would not amount to the profit from a good morning's work (and they could not go about their business if they could not find willing buyers). As far as the purchasers are concerned, the Trade Press, which normally gives good coverage of court proceedings, reported one case in the last three years of householders being prosecuted, and that was in the Autumn of 1977 in Manchester; there were apparently no similar prosecutions in Scotland. Thus in Glasgow law enforcement officers diligently carry out their duties only to see their efforts being thwarted by the courts. The Trade Press also reported Mr. Feeley, speaking on behalf of the National Society for Clean Air in December 1977, as saying that the Society would be calling for the courts to apply stiffer penalties. It would seem unfortunately that the call went unheeded and it may be that there are good reasons, some possibly political, for not prosecuting householders, but nevertheless the powers are written into the Act. It seems unfair and unreasonable that because these deterrent powers are not being fully utilised, the Trade should be expected to produce a simple, enforceable alternative that is going to put an end to this problem.

In the smaller District Council with smoke control areas in a town not the size of a single Glasgow housing scheme, the Environmental Health Service department might well be under-staffed and its inspectors hard-pressed to keep pace with the welter of legislation they are expected to administer. As a result, as one inspector stated, smoke control comes very low in the order of priorities. So low in fact that in one such area, a reputable merchant's sales of smokeless fuel were so seriously affected by a competitor selling bituminous coal that he supplied the Environmental Health Department with a list of names and addresses of people regularly buying bituminous coal and the days on which the offending merchant was in the area. All to no avail; there was no improvement in the situation and certainly no prosecutions resulted. The inspector also put the view that since the introduction of Smoke Control there had been changes both in attitude and the make-up of the council and now he doubted if the councillors on his committee would be in favour of prosecutions. If these difficulties and fears are founded then the problem of attaining effective implementation of the Act is vast; the solution would seem to lie far outside the ambience of the Coal Merchants Association. That is not to say that it should shrug off responsibility: The Executive of the C.M.A.S. has decided it would not be opposed to Mr. Feeley's proposal that licensing should be introduced, and is pledged to co-operate with local authorities and others in the implementation of the Clean Air Act. But the general introduction of licensing might be yet another straw on the back of an already over-burdened administration.

There is of course another drastic but certainly effective solution to the question, and that is to make the use of solid fuel in any form impossible in the problem areas. This has been carried out to varying degrees in almost every town in Scotland, with the wide

spread construction of flueless houses. That certainly brings to an end any possibility of smoke nuisance, but it has presented a whole new set of problems, such as exorbitantly high heating bills, with tenants in some cases being afraid to use the heating because of fear of the cost and problems of condensation and its attendant troubles such as expensive damage to buildings and their contents, high maintenance costs, and a far from healthy home environment. There is no doubt that the introduction of the "all electric" house has given clean air but has introduced some new miseries. It has also been a major factor in reducing the number of merchants in Scotland from over 1800 in 1964 to something in the region of 700 in 1979. Admittedly, even when householders have had freedom of choice solid fuel has not always fared as well as the Trade would have wished, but as long as there is a choice, those in the Trade still have the opportunity of retaining business and it rests fairly and squarely with the Solid Fuel Industry to woo the public back by producing the right fuels and the right appliances on which to burn them.

IMPORTANCE OF THE DOMESTIC COAL TRADE

The domestic trade still has a very vital economic and social role to play in society today. The seven hundred odd coal merchants in Scotland sell over 1 million tonnes of coal and nearly $\frac{1}{4}$ million tonnes of smokeless fuel per year, and with coal at over £50 per tonne and smokeless fuel averaging over £70, this is big business in anybody's book. The Trade is a large employer of labour, both in production and distribution. Despite fierce competition solid fuel is still the first choice of heating for many people. Collectively, those in the domestic market are the National Coal Board's second largest customer and it is important that the trend back to solid fuel continues. As Sir Derek Ezra, Chairman of the N.C.B., has frequently said, with present day mining techniques there are sufficient known resources of coal in the U.K. to last for 300 years. He took this a stage further in a speech made in Glasgow (June 1979) when he said it was reasonable to assume that techniques will improve and that the estimate may be extended to a thousand years. Not even the wildest optimist would give a similar estimate on the life of other fossil fuels. However, this was not to suggest that men will go down holes in the ground to dig coal for people to throw on fires in their living rooms for the next thousand years, but the reserves of coal will be of inestimable use to future generations and it is important that a viable and buoyant coal industry is maintained today, because, as was learnt in the 'sixties, once allowed to run down it is very difficult and expensive to re-start. The domestic trade is playing its part in keeping the mining industry alive and well, even if in the long term the utilisation of coal changes to such a degree as to make the coal merchant obsolete.

There is no reason to suppose that the burning of solid fuel should be synonymous with dirty smoke; of the 46000 appliances sold in Scotland in the past year over a quarter were closed appliances which should never produce a puff of black smoke, and many purchasers of open fires will use only smokeless fuel. Currently there are no shortages of smokeless fuels for open fires, or for closed appliances for that matter even if some of the preferred qualities are a little difficult to come by. Research is constantly being carried out to improve fuels and the appliances on which they are burned, and of course top priority is given to ensuring that neither the appliances or the fuels produce smoke.

CONCLUSION

To sum up, the coal merchant has an important role to play in domestic heating and that role can be fulfilled without smoke-pollution. The Trade needs to be rid of the few bad eggs, although the answer really lies more in legislation which carries penalties of

sufficient severity to achieve this end without being oppressive to the reputable trader. While solid fuel is in competition with other forms of heating the demand is such that the Trade is complementary, and will be complementary to other energy sources as yet not developed but which will come in the future. It is many years since the marketing opportunities were so high, helped by continuing oil crises and the realisation that supplies of natural gas are not limitless and the apparent end of price controls on that particular fuel. But the legislators and administrators of the law ought not to hamper the activities of the reputable merchants as their success may be for the good of all.

EEC DIRECTIVE ON HEALTH PROTECTION STANDARDS FOR SULPHUR DIOXIDE AND SMOKE

At a meeting on Monday December 17th, the EEC Ministers of the Environment reached agreement on a directive on health protection standards for sulphur dioxide and suspended particulates (smoke). This directive (Ref. 1) was first proposed for discussion amongst Member States in 1976.

After a great deal of discussion, the European Environment Ministers have agreed limit values for sulphur dioxide and smoke to be observed throughout the Community; and also discretionary guide values for further improvement. Announcing the agreement, the Department of the Environment says that implementation of the directive in the UK will be achieved "mainly by extension of smoke control. In a few areas it may be necessary to introduce regulations controlling the sulphur content of fuel oil. This will involve a phased programme which will be developed in consultation with the bodies concerned."

The levels agreed for the health protection standard are above those recommended by the WHO Expert Committee as long term goals, and are as follows:

1. Daily mean concentrations of suspended particulates (smoke) not to exceed $150 \mu\text{g}/\text{m}^3$ with sulphur dioxide not to exceed $250 \mu\text{g}/\text{m}^3$ for more than seven days per year, unless the daily mean concentration for particulates is less than $150 \mu\text{g}/\text{m}^3$, when the concentration of sulphur dioxide is not to exceed $350 \mu\text{g}/\text{m}^3$. If sulphur dioxide is below $250 \mu\text{g}/\text{m}^3$, particulates may reach the level of $250 \mu\text{g}/\text{m}^3$.
2. Winter median values of daily mean particulates and sulphur dioxide not to exceed $130 \mu\text{g}/\text{m}^3$ unless the median value of particulates is less than $60 \mu\text{g}/\text{m}^3$, when the median value of sulphur dioxide is not to exceed $180 \mu\text{g}/\text{m}^3$.
3. Annual median values of daily mean particulates and sulphur dioxide not to exceed $80 \mu\text{g}/\text{m}^3$ unless the median value of particulates is less than $40 \mu\text{g}/\text{m}^3$, when the median values of sulphur dioxide is not to exceed $120 \mu\text{g}/\text{m}^3$.

Dr M.J.R. Schwar of the GLC's Scientific Branch pointed out in his paper to the 1979 Clean Air Conference (Ref. 2) that these criteria have been based on a particulate concentration estimate made from the measurement of the darkness of a stain on a filter

paper through which a known volume of air has been drawn, and that they are therefore really smoke concentration criteria rather than total suspended particulate criteria.

The variation in the allowable daily mean concentration of sulphur dioxide can be seen to be affected by a smoke trigger of $150 \mu\text{g}/\text{m}^3$. The smoke trigger level proposed in the draft directive was $100 \mu\text{g}/\text{m}^3$, and the UK representatives at the discussions have been holding out for the higher figure. It seems their arguments have carried the day. Now it remains to be seen whether urban areas in the UK will meet these levels. Obviously some local authorities will have to push their smoke control programmes along more quickly. Other areas, with smoke control pretty well complete but where there are still relatively high levels of sulphur dioxide, may need controls on the sulphur content of fuel oil.

REFERENCES

1. Official Journal of the European Communities. Proposal for a Council Directive concerning Health Protection Standards for Sulphur Dioxide and Suspended Particulate Matter, 19 March 1976.
2. Schwar, Dr M.J.R., The Accuracy, Interpretation and Use of Results Obtained from Monitoring and Measurement of Air Pollution. Proc. NSCA 46th Clean Air Conf. Oct. 1979.

A STANDARD FOR DESCRIBING AIRCRAFT NOISE

BSI have published a standard which gives a procedure for describing the noise heard on the ground from aircraft operations, BS 5727 **Method for describing aircraft noise heard on the ground** (ISO 3891). It specifies four steps to be followed for the purpose of describing the noise and provides a method for determining a noise-exposure measure for a succession of operations in a given interval. The results may be used for evaluating the effect of aircraft noise on people.

BS 5727 may be applied to description of noise in flight or on the ground and two main applications of the measurements are distinguished, i.e. for single events (such as measurement of noise from an individual craft) and for determination of noise exposure resulting from a succession of events such as general airport noise. The standard distinguishes two main conditions under which the noise is heard: one where the aircraft noise dominates to the extent that it is assessed apart from the noise environment, the other where the aircraft noise is assessed as one among the other noises affecting a community, such as from road traffic or from industrial premises.

The careful distinctions made in the fields of application illustrate the complexity of noise measurement, and BSI hope that this important new method will go a long way towards establishing standard practice in taking such measurements.

Copies of BS 5727 may be obtained from BSI Sales Department, 101 Pentonville Road, London N1 9ND. Price £7.50. (BSI Subscribing Members £4.50).

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SEMINAR ON NUCLEAR POWER

Report by **Colin Cresswell** Hon. Secretary, Northern Division, NSCA

Over 400 delegates attended a Seminar on Nuclear Power organised on 3rd September at Ashington Technical College by Northumberland County Council. This was the largest in a series of meetings, the purpose of which is to inform members and officers of local authorities and other interested bodies on nuclear power in general and on the current investigation by the Central Electricity Generating Board into the suitability of Druridge Bay as a site for a nuclear powered electricity generating station.

The two sites on which tests are being carried out each occupy approximately 200 acres but the actual generating station would eventually cover approximately 50 acres of land. Druridge Bay has not been formally designated as an area of outstanding natural beauty but it is an unspoilt 6 mile stretch of coastline greatly admired by many people approximately 25 miles north of Newcastle upon Tyne.

After a very brief introduction by Lt. Col. R.A. Barnett, Chairman of Northumberland County Council, the scene was set in a humorous fashion by Col. Smail, Chairman of Northumberland County Planning Committee and the proceedings got under way by the showing of a Central Electricity Generating Board film 'Nuclear Generation'.

There followed papers firstly by Mr L. Nash, Senior Planning Engineer (North), Central Electricity Generating Board on 'Site Requirements for a Nuclear Power Station' and Mr T.P. Hair, Principal Inspector Nuclear Safety Branch of the Central Electricity Generating Board, on the 'Board's Policy on Nuclear Safety'. Mr Nash briefly described the tests being undertaken by the Board and the anticipated timetable of events. Druridge Bay apparently was the only suitable situation between Hartlepool and Berwick for a station, a coastal site being essential to provide the necessary large quantities of cooling water. It was anticipated that the Board would reach a decision on the suitability of Druridge Bay during the first half of next year and subject to the decision being favourable formal application would follow in the early autumn. Mr Hair thought it would be highly unlikely that the first Pressure Water Reactor (PWR) would be used; the station if erected would most likely be served by an Advanced Gas Cooled Reactor (AGR).

N.B. The PWR is the American type of reactor which recently gave rise to problems at Harrisburg while the AGR is the type currently under construction at Hartlepool.

Dr M. Flood, an Energy Consultant for the Friends of the Earth, put the opponent's view extremely well, citing numerous examples of where the Board's Nuclear Policy had failed and also had proved to be very expensive. His main attack however, was concentrated on the Board's case for a new generating station, of any type, and he accused them of badly over-estimating the demands for power. Mr J. Urquhart, Statistician and Research Librarian, University of Newcastle upon Tyne, backed up Dr Flood by disputing, amongst other things, the Board's figures which indicate that nuclear produced power is the cheapest.

Mr. M.J. Parker, Director of Central Planning, National Coal Board, spoke about the need to make use of all fuels in the production of energy and surprised some of the

audience by saying that any new coal fired power stations would retain the traditional method of firing, i.e. pulverised fuel, and not make use of the new highly publicised efficient fluidised-bed system; the future for the latter was seen to be more in the firing of industrial boilers. Mr Parker also disclosed that consideration is being given to re-furbishing Dunston Power Station with new equipment which would increase its generating capacity and reduce emissions.

Mr P.C. Warner, Head of Corporate Engineering NEI Ltd., and a Council Member of the British Nuclear Forum, talked about the ways in which North East industry was involved in producing all types of power station equipment. The final paper was presented by Mr W.S. Gronow, Deputy Chief Inspector, H.M. Nuclear Installations Inspectorate, who in response to the question, 'why site nuclear stations in rural areas if they are as safe as claimed', explained that population density in the vicinity of any nuclear station should be sufficiently low to ensure that in the event of trouble, emergency services could be quickly moved to the site. Mr. Gronow's statement that all was well at BNF Windscale, and there was no cause for concern over the increased radio-activity in the Irish Sea, came as a shock to some of the audience.

The Seminar wound up with an open forum chaired by Professor G.R. Bainbridge, Director of the Energy Centre, University of Newcastle. During this discussion the enormous difference in the appearance of a nuclear station compared with the more traditional coal-fired and oil-fired stations was stressed, as were the considerable costs involved at existing stations in raising overall efficiency by introducing combined heat and power systems. The latter is something which has always attracted conservationists, as most generating stations operate at about 30% efficiency with a large amount of waste heat being lost through cooling towers and into rivers etc. If this waste heat could be utilised in District heating schemes and the like, the overall efficiency of the burning of fuel would be raised to 75 to 80%. Such a scheme has been in operation since just after the war in Pimlico where Battersea Power Station supplies the heat, but the cost of underground mains and possibly adapting heating systems to individual houses would be expensive.

Very many questions were asked, in fact, far more than could be answered in the time available, and Professor Bainbridge controlled the session in an efficient manner until his summing up at the end. This unfortunately he did in a most biased manner, upsetting a large number of the audience in the process.

Northumberland County Council are to be congratulated on organising such an interesting meeting on a vital subject. Everybody who attended must have learned something and possibly a few people had their opinions changed as a result of what took place.

DIVISIONAL NEWS

NORTHERN DIVISION

Fifty-two members were welcomed to Wallsend on 23rd November 1979 by Councillor Mrs. C.M.A. Brown, Chairman of the Environmental Health Committee, North Tyneside Metropolitan Borough Council.

Prior to the main purpose of the meeting, which was a discussion on 'Energy Saving', some time was spent talking about the sale of coal from corner shops. This particularly thorny problem, which primarily affects authorities who have more or less completed their smoke control programmes, requires new legislation in the opinion of the members. The Division was also dissatisfied with the lack of a satisfactory answer from the Clean Air Council with reference to the anomaly that has existed since Circular 54/76 which allows grant to be paid for fan assistance to existing underdraught fires, but not for replacing approved open fires. The members also took note of the recent retirement of Mr J. Hill, Chief Environmental Health Officer, Langbaugh Borough Council, who had for many years been a clean air stalwart, and wished him a long, healthy and happy retirement.

The demise of the Joint Clean Air Committee for the North East was also duly noted and it was decided that the work done by this Committee in the past should be continued by the Divisional Council.

Mr G.V. Cope, B.Sc., C.Eng., M.Inst.E., Fuel Efficiency Officer to Newcastle Metropolitan Borough Council introduced the B.P. film "Energy Within Reason". In his opening remarks prior to the discussion which followed, Mr Cope made particular reference to the production of carbon dioxide and, to a lesser extent, water vapour, as a result of the combustion of fossil fuels. Mr Cope suggested that carbon dioxide in particular, with the greenhouse effect created, may well be more important in the medium term than the quantity of coal available. He appreciated that this was a question where opinions differed and that there were alternative arguments which indicated the effects were negligible. However, it was, in his opinion, a matter to which those interested in reducing air pollution should be directing their attention. He stressed the importance of proceeding with caution before producing a new energy policy, but these particular remarks were not intended to apply to conservation where a saving in energy worked to everyone's advantage.

A long and interesting discussion followed in which numerous members took part. Amongst the points raised were the relationship between fuel efficiency and pollutants emitted, the need for legislation to make conservation of energy an essential part of life, the value of combined heat and power, the place of geothermal energy, the need for an international approach, the long term consideration of limiting population growth in areas where energy supplies were low, correctly designed plant which would allow for 'turn down' without loss in thermal efficiency, etc..

One contribution worthy of particular mention was made by Councillor Mrs Stabler of Stockton Borough Council. She and her husband having won £50 with a Premium Bond invested the money in materials from which they produced a system which allowed them to have hot water from solar energy. Although in the North we are inclined to think that we receive a relatively small proportion of warm sunny weather, making the expense of installing a solar energy system uneconomic, Mrs Stabler believed this to be untrue and cited the day before the meeting when water from her bathroom solar heated hot water tap was 3°C. higher than that from the traditional heating system.

The meeting ended with the Chairman, Councillor L. Poole, BEM, JP., thanking Mr Cope for showing the film and introducing the discussion.

C.R. Cresswell
Hon. Secretary

NORTH WEST DIVISION

Essay Competition — 'Clean Air Rules O.K.!'

The North Western Division has for some time been planning an Essay Competition as a means of generating interest amongst young people in the need to maintain improvements in pollution of the environment. Many schools include Community Studies amongst their subjects and it was felt that encouragement from our Society would be of benefit. In some areas Environmental Health Officers are able to help by giving talks in schools.

The Competition is now being launched by circulating publicity material via the Local Education Authorities in the Division.

The Competition is open to two age groups, 11 to 13 years and 14 to 16 years and the prizes for each will be a Bicycle for the author of the winning Essay and a Music Centre for his/her school. The Essays should not exceed 1,500 words and entries are to be received by the Divisional Secretary by 31st March 1980. A team of Divisional Members will act as Judges and further details will be available when the prizewinners are announced.

Sponsorship for the Competition has been provided by the Merseyside and North Wales Electricity Board, North Western Electricity Board, Central Electricity Generating Board, North Western Gas Board and the National Coal Board. This has been in the form of financial backing and the printing of posters and application forms. The Division wishes to thank the Sponsors for this generous support without which the Competition could not have been attempted.

Additional information may be obtained from Mr J.B. Douglas, Honorary Secretary (North Western Division), c/o Environmental Health Department, Wesley House, Corporation Street, St. Helens. WA10 1LF.

J.B. Douglas
Hon. Secretary

INTERNATIONAL NEWS

SOUTH AFRICA

**4th International Clean Air Conference, Pretoria, South Africa,
22nd — 25th October 1979**

It was agreed by many of the delegates who were fortunate enough to attend this Conference, that this was one of the best, if not the best, conferences which they had ever attended. The Conference was held in the new CSIR (Council for Scientific and Industrial Research) Conference Centre which has been purpose built and houses all necessary Conference facilities under one roof. The Organising Committee are to be congratulated on the success of the Conference and the smooth way in which everything worked. Everything looked easy, but to those who know about such things, it was clear that a great deal of organising and work had been going on for a very considerable time to ensure that the Conference was the success which it undoubtedly was.

Although most of the delegates were from South Africa, there was a good sprinkling of delegates from overseas and the fact that the Executive Committee of IUAPPA was meeting during the course of the Conference ensured that IUAPPA, headed by its President Dr J.A. Rispoli, was well represented. As Dr Eric Halliday, of the National Air Pollution Advisory Committee, remarked in his closing review of the Conference, the speakers at the plenary sessions did their tasks very well and provided valuable information in their respective fields. As regards the other papers, as was only to be expected some were better than others. Some undoubtedly broke new ground while others were concerned with the present state of the control of atmospheric pollution, particularly in South Africa. As Dr Halliday said, a number of papers reflected public impatience with the slowness of cleaning up the atmosphere but a greater number indicated that those in administration and those concerned with the control of emissions should refrain on the one hand from being too complacent and on the other hand from extremes of violent action seeking immediate results. Nevertheless the sessions on technical aspects of air pollution control indicated that many industries were making considerable efforts to meet emission requirements, but that even so, it would be some years before really satisfactory results are obtained.

In the sessions on medicine, legal aspects and controls, concern was expressed that the general public lacked information about the true nature of pollutants emitted by industries and the effect of adverse atmospheric conditions on such emissions. In the sessions on research Dr Halliday considered that there was a clear indication that research work on the physics of the atmosphere had now reached a point where mathematical modelling was becoming of practical value. In all, some 76 papers were presented and they covered a very wide spectrum; those who attended the Conference left with plenty to think about.

(The above report was published in IUAPPA Newsletter, Vol. 4, No. 24, December 1979)

AIR POLLUTION - IS OUR AIR CLEAN ENOUGH?

One Day Symposium held by the Derbyshire Branch of the Conservation Society

Report by **Mike J. Drinkwater**, MEHA, Exhibition Organiser, Amber Valley D.C.

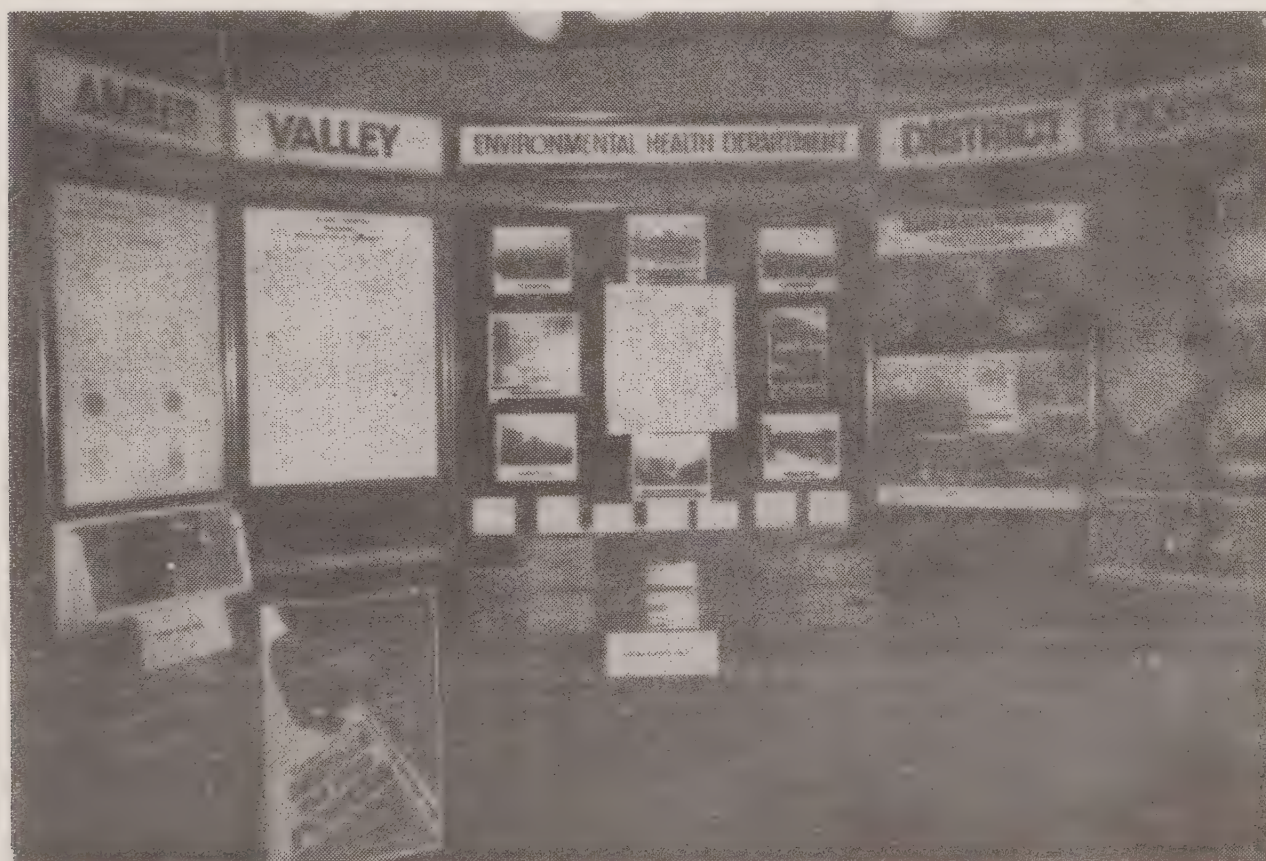
The Symposium, held in Derby on Saturday, 24th November 1979 and asking the question "Air Pollution — Is our Air Clean Enough?", was sponsored by the European Environmental Bureau. It was reasonably well attended by members of the Conservation Society and other professional bodies and individuals but could no doubt have attracted another thirty or so people if the month chosen had been early Spring or early Autumn when travelling does not present difficulties.

Mr A. Wenn was the Chairman for the day and is the Chief Environmental Health Officer of the City of Derby. He commenced the day by introducing Mr A.M. Price, from the Commission of European Communities (Division of Air Pollution), whose opening speech brought apprehensive smiles from the audience as he spoke in a variety of European languages before breaking into fluent English. Mr Price outlined the position of

the EEC in relation to the control of air pollution and the Directives, Regulations and Recommendations implemented and to be implemented by the EEC.

The problems of a large chemical plant were then discussed by Dr A.E. Nicholson, the Site Manager from British Celanese, Derby. Dr Nicholson covered the major processes in the plant and explained their associated problems, emphasising the need for strict maintenance schedules, leak detectors and the possible recycling of waste for use as potential fuel. He also demonstrated the need for rigid control of air pollution as this represented a direct loss to the Company.

Mr M. White spoke next from the H.M. Alkali and Clean Air Inspectorate at Sheffield. He gave the impression that the Inspectorate was indeed now more active than in recent years and that great co-operation between industry and the Inspectorate had achieved some notable improvements. Mr White's talk was well illustrated with slides, showing a variety of "before and after" shots but posed the interesting question of how much are we prepared to pay to achieve an ultimately cleaner society based upon the theory of diminishing marginal returns. He referred in particular to the situation in Sheffield, where great problems had been encountered with the iron and steel industry.



Exhibition by Amber Valley D.C.

Mr. J. Barrie Sheard, Deputy Director of Environmental Health, Amber Valley District Council, Derbyshire, delivered an excellent talk explaining how the District Council is combatting pollution. The basic monitoring equipment was explained as well as being displayed in the exhibition mounted in the foyer. The two extended surveys on particulate sulphates and the multi-elements survey were dealt with, showing how the UK, as one of the member states of the EEC is looking ahead to tomorrow's possible problems. Members were reminded that the UK was the first European country to have a specific

Clean Air Act and that smoke levels since 1956 have been reduced 90%. Whilst the achievement was notable, Mr Sheard also emphasised that there was a considerable amount of work still to be done particularly when comparing the EEC draft Directive on smoke and SO₂ and existing results of the Warren Spring Laboratory Study. Planning for a cleaner future was enlarged upon by Mr F. Joyce a researcher on Urban Environment at the University of Aston, Birmingham. In his short but informative talk he too questioned the cost-benefit factor of pollution control.

During the lunch break interest was shown in the Exhibition presented by the Environmental Health Department of Amber Valley District Council. This included a working Smoke and SO₂ Daily Volumetric Machine and displays of the Belper and Ripley yearly graphs 1977 – Oct. 1979 of the Warren Spring Laboratory Survey. Some photographs showing visual pollution before and after controls had been enforced were shown, along with a portable daylight slide screen complete with appropriate music and automatic slide change showing 80 slides on all aspects of pollution problems and answers. For the loan of the photographs and for supplying many leaflets and posters we are indebted to the National Society for Clean Air.

Dr A. Roberts, manager of the Engineering Sciences Branch, C.E.G.B., Ratcliffe-on-Soar, opened the afternoon session with a comprehensive analysis of the production of electricity mainly from coal-fired power stations. Dr Jones assessed the impact of emissions from such plants with the use of results from the many and varied instruments used for sampling. The C.E.G.B. even has aeroplanes flying over the North Sea measuring pollutants involved in long term transport world wide. He concluded that so long as the plant was working efficiently, the pollution was minimal.

The effects of air pollution on vegetation was shown by Dr M.H. Unsworth from the University of Nottingham, who, with a variety of slides, some from Canada, revealed some astounding effects upon surrounding vegetation if indeed the latter had continued to survive. He was also able to demonstrate that immediate effects such as stunting of growth was often succeeded by a failure of the soil to be capable of promoting any vegetation whatsoever. He concluded by suggesting that a greater concern for long term effects should be considered and that the well known Lichen Zones of the UK should be used even more to monitor the environment.

Mr A.M. Price concluded the Symposium (his speech entirely in English) and advised the group of the intention of the EEC with regard to air pollution, not only for the protection of human health but with regard to plant life and social life. He explained the theory of the EEC targets which would be implemented by the individual member states. Should these targets not be achieved in the suggested time (by 1990) then derogation would be given by the Council of Ministers subject to a plan being submitted by that country detailing the methods to be employed in achieving the targets. This could mean that recalcitrant District Councils will find that the appropriate Government Department will step in and make the full implementation of the Smoke Control programme compulsory.

Criticism of the Symposium would perhaps relate to the short time available for discussion. The programme was perhaps too intense, in that the number and variety of subjects covered was too much for the time available. However, the day, whilst not answering its titled question "Is our Air Clean Enough?", was informative and posed many questions in relation to our future methods of control.

This type of approach, involving a combination of lay members of the community, is felt to be a worthwhile change of direction and away from the "norm" of meetings designed only for those already converted to the cause of Clean Air.

NATIONAL SOCIETY FOR CLEAN AIR

**WORKSHOP ON
ENERGY CONSERVATION**

April 1 & 2 1980

Tapton Hall, Sheffield University

- The Need to Conserve Energy. *John Moore, MP* (Department of Energy)
- Energy Saving in the Home – Now. *Miss Edith Baillie* (North Thames Gas)
- Design for Energy Saving in the Home of the Future. *Dr J.E. Randell* (University of Salford)
- Energy Saving in Public and Commercial Buildings. *M.G. Burbage-Atter* (Energy Consultant)
- Transport – the Future. *Professor J. Swithenbank* (University of Sheffield)
- Combined Heat and Power. *W.R.H. Orchard* (Orchard Partners and District Heating Association)
- Energy Saving in Industry. *Harry Brown* (Energy Consultant)
- The Practical Application of New Sources of Energy. *M. Hadlow* (Integrated Energy Systems Ltd)
- General Discussion – *Panel of Experts*

Fee: Members of the Society appointing delegates – £62.50 + VAT per person.
Non members of the Society – £70.00 + VAT per person.

Fee includes accommodation, full board and course material.

Details and registration forms: NSCA, 136 North Street, Brighton. BN1 1RG.
Tel: 0273 26313

FUTURE EVENTS

A Brief Guide to Conferences and Courses in 1980

UNITED KINGDOM

13 and 14 March **Detection and Measurement of Hazardous Gases.**

A Course of postgraduate or post-experience lectures, arranged by Prof J.H. Burgoyne, Dept. of Chemistry, The City University, London.

Details: The Secretary of the Chemistry Department, The City University, Northampton Square, London EC1V 0HB. Tel: 01-253 4399, ext. 532.

24 – 27 March **Disposal of Chemical Wastes.** Loughborough University of Technology. and

23 – 26 September

Within the framework of current legislation these two courses will compare the techniques currently available for chemical wastes' disposal. Fee: £155 per course, incl. accommodation and course material.

Details: Centre for Extension Studies, Loughborough University of Technology. Tel: 0509 63171, ext. 249

1 and 2 April **Workshop on Energy Conservation.** Tapton Hall, Sheffield University.

Details: National Society for Clean Air, 136 North Street, Brighton BN1 1RG. Tel: 0273 26313.

Fee: Members of the Society £62.50 (+ VAT), non-members £70 (+ VAT), incl. accommodation and course material.

27 April – 2 May **Air Pollution in the Workplace. Course.** Loughborough University of Technology.

Fee: £225, incl. accommodation and course material.

Details: Centre for Extension Studies, Loughborough University of Technology. Tel: 0509 63171, ext. 249

21 – 29 June **5th International Festival for Mind-Body-Spirit.** Olympia, London.

Ecology and Environment, Alternative Technology, plus health and arts.

Details: Festival for Mind-Body-Spirit, 159 George Street, London W1H 5LB. Tel: 01-723-7256.

22 – 25 September **47th Clean Air Conference, Bournemouth.** National Society for Clean Air Energy and the Future Environment; Noise; Pollution from Road Vehicles; Smoke Control. Fee:

members of the Society £55 (+ VAT), non-members £65 (+ VAT).

Details: National Society for Clean Air, 136 North Street, Brighton BN1 1RG. Tel: 0273 26313.

2 – 7 November **Environmental Air Pollution. Course.** Loughborough University of Technology.

Fee: £275, incl. accommodation and course material.

Details: Centre for Extension Studies, Loughborough University of Technology. Tel: 0509 63171, ext. 249.

OVERSEAS

27 and 28 March **Biotechnology - a Hidden Past, a Shining Future.** 13th International TNO Conference, Rotterdam Hilton.

Technical, social and political aspects of biotechnology. Fee: Dfl. 630, incl. accommodation and meals, Dfl. 410 without accommodation.

Details: The Secretariat of the TNO conference, 148 Juliana van Stolberglaan, 2595 CL The Hague, (P.O. Box 297, 2501 BD The Hague), The Netherlands.

24 and 25 April **Energy Conservation and Environmental Control. Symposium.** Astoria Hotel, Brussels, International Association of Environmental Coordinators.
Details: Ms C. Vander Borgh, I.A.E.C., Avenue George Bergmann, 38, Bte 3, 1050 Brussels, Belgium.

7 – 11 October **Man and Machine Noise.** 11th Congress of the International Association Against Noise (AICB). Varna, Bulgaria.

Medical, technical and social aspects. Fee: US\$ 80, or US\$ 100 for registrations made after 31 May, 1980.

Details: Noise Abatement Committee in Bulgaria, 108 Rakovski Street, Sofia 1000, Bulgaria.
Telex: NTS 22185, Sofia.

CALL FOR PAPERS

International Environment and Safety Exhibition and Conference. 1 – 4 September. Wembley Conference Centre, London.

Session 2, Air: pollution; causes; effects; monitoring; sampling; analysis; filtration; air movement and atmospheric changes; legislation; case studies;

Other Sessions: 1. Water; 3. Land; 4. Safety and Health in the Workplace; 5. Energy and Resources; 6. Safety and Environmental Factors in Transport.

The deadline for submission of papers has been extended to the end of March 1980. **Synopses and further enquiries to:** Conference Organiser, International Environment and Safety, Newgate, Sandpit Lane, St. Albans, Herts. AL4 0BS.

Industry and Environment. 9 – 11 September. Loughborough. Jointly sponsored by Loughborough University of Technology and the Institute of Environmental Sciences.

Policies, programmes, education and training. 200 word abstract to be submitted by the end of March 1980.

Enquiries to: The Administration Officer, I & E Conference, Centre for Extension Studies, Loughborough University of Technology, Loughborough, Leicestershire. Tel: 0509 63171, ext. 249.

Man and Machine Noise. 17 – 11 October. 11th International Congress, AICB. Varna, Bulgaria.

Details of Call for Papers from: Jane Dunmore, National Society for Clean Air, 136 North Street, Brighton, BN1 1RG. Tel: 0273 26313.

LETTER TO THE EDITOR

Dear Sir,

In *Clean Air* (Vol. 9, No. 3, June 1979, page 80) Dr Barltrop in his paper on 'Lead Emissions' notes a "lack of any data from countries which have removed lead additives from motor fuels but have so far not yet reported any diminution in blood lead values as a result." This is no longer the case:

There is a study, conducted by the Washington Department of Housing and Urban Development, which examined a data set of 178,000 blood lead levels collected from New York City children in the period from 1970 to 1976. The study found a significant relationship between blood lead and air lead levels, and an even stronger correlation with the amount of lead consumed in petrol during the same period. (I.H. Billick, A.S. Curran, D.R. Shier, 'Relation of Pediatric Blood Lead Levels to Lead in Gasoline', Environmental Research Group, Department of Housing and Urban Development, Washington, D.C. 20410).

This is the largest study of its kind to date, and demonstrates that a seven year

decline in the American sales of leaded petrol was dramatically reflected in reduced blood lead levels; and that high sales of leaded petrol produced dramatically higher lead levels — up to 30% higher. It also shows that blood lead levels were highest in children aged 25-36 months.

Dr Billick, one of the researchers involved, estimated, according to the Birmingham Post (11/10/79) that, if there were no lead in petrol, "levels in young children would slump to the much safer 10mcg mark."

Dr Billick is further reported in the Post as saying: "The results stopped the U.S. Department of Energy from ditching the programme of reducing gasoline lead. Last year it allowed 1.2 grammes per gallon. Since October 1st that figure is 0.8."

I have a copy of a memorandum from Dr Billick to the Environmental Protection Agency, dated April 3rd 1979, which ends as follows:

"The association between blood lead and lead in gasoline and lead air quality persisted both seasonally and over a long term trend across the seven year period. This strong evidence that population blood leads respond to lead level in the gasoline consumed is additionally supported by the situation in the summer of 1973. Consumption and lead content was particularly high and population blood leads were also abnormally high.

The association of blood lead and gas lead is consistent across groups divided by age, ethnic group, and location within the city. Other possible sources of lead exposure such as lead-based paint ingestion would not be expected to have a uniform impact across age, geographical area or seasonal factors.

Based on the New York data Housing and Urban Development has calculated a regression equation between gas lead content and gas consumption, and resulting blood leads. This equation predicts that for a composite population of New York children, a gas pool of between 0.8 and 0.9 g/gal is necessary to maintain the geometric mean population blood lead at 15 $\mu\text{g Pb/dl}$ in 1980, 1981. This estimate is for a composite population of children typical of those screened in past years, there is evidence that certain sub-groups of children are consistently higher than the composite group."

(A geometric mean blood lead of 15 $\mu\text{g Pb/dl}$ has been adopted by the Environmental Protection Agency in the States as the maximum safe population blood lead level, although many would argue that such a level in young children particularly is still too high).

This research study is reported as having convinced President Carter to take action — I have sent a copy to Mrs Thatcher in the hope it may have the same effect on her.

Yours faithfully,

Nicholas Albery
107 Freston Road
London W11.

Editors Note: Dr. Barltrop's paper was prepared for the NSCA Workshop on Pollution from Road Vehicles, held in April 1979.

NEW SMOKE CONTROL ORDERS

The lists below are supplementary to the information in the issue of **Clean Air (Vol. 9, No. 5)** which gave the position up to **30th June 1979**. They now show changes and additions up to **30th September 1979**.

Some of the areas listed are new housing estates, or areas to be developed for housing. The total number of premises involved will therefore increase.

The list of new areas in operation of smoke control is based on the plans submitted to the Department of Environment, but may erroneously include some local authorities who have made postponements, without notifying the Ministry of the fact.

ENGLAND

NEW SMOKE CONTROL ORDERS IN OPERATION

Northern

Allerdale No.7 (Vulcans Park, Workington); Hartlepool No.34; Langbaugh No.4 (South Bank North); Middlesbrough No.28 (Marton Road/Longlands Road), No.29 (North Ormesby), No.30 (St. Hilda's) and No.31 (Borough Road/Linthorpe Road); North Tyneside Nos.7, 8, 9, 10, 11 and 12.

North West

Blackburn No.19; Bolton No.11 (Bolton No.52B) and No.12 (Bolton No.52C); Chorley No.3 (Ulmes Walton); Liverpool No.29; Manchester, City of (Clayton Vale); Rochdale No.5 (former B. of Middleton completion); South Ribble Nos. 6, 7 and 8; Tameside (Stalybridge No.20); Warrington No.4 (Lymm); Wigan (Tyldesley No.7).

Yorkshire and Humberside

Barnsley No.13, No.14 (North Royston) and No.25 (Platts Common); Calderdale No.23 (Halifax Stump Cross/Northowram); Harrogate No.5A (Killinghall Moor); Wakefield (Normanton No.3).

West Midlands

Birmingham No.164, No.168, No.170 and No.171; Coventry No.21; Dudley No.136 (Coseley) and No.138 (Woolaston South); Nuneaton No.18 (St. Mary's/Coton); Solihull No.19; Stoke-on-Trent No.34; Warwick No.9 and No.13; Wolverhampton No.22 (Merry Hill and Penn Fields Area); Wrekin No.3; Wyre Forest No.2.

East Midlands

Ashfield No.7 and No.8; Chesterfield No.11 (St. Augustine's and Birdholme); Gedling No.6; Lincoln No.16; North Kesteven No.2 (North Hykeham); Nottingham No.9.

East Anglia

Peterborough No.6 and No.7.

South West

Bath City No.1.

South East

Bracknell No.7 (Sandhurst/Ambarrow); Southampton No.19 (Bitterne Park).

London Boroughs

Hillingdon No.35.

NEW SMOKE CONTROL ORDERS CONFIRMED BUT NOT YET IN OPERATION

Northern

Allerdale No.9 (Gray Street Workington); Hartlepool No.36; North Tyneside Nos. 13, 14, 15, 16, 17 and 18; Sunderland No.17.

North West

Burnley No.2; Halton No.18 (Runcorn No.13) (Parish of Moore); Rossendale No.3 and No.4.

Yorkshire and Humberside

Kirklees (Huddersfield) No. 14 (Berry Brow).

West Midlands

Dudley No.139 (Woolaston North) and No.140 (Coseley); Walsall No.27 (Birchills) and No.29 (Coppo Hall, Consolidation); Wrekin No.5.

East Midlands

Derby Nos. 31 and 33.

South West

Exeter (Aldens Farm).

South East

Guildford No.5.

London Boroughs

Kingston upon Thames No.27.

**NEW SMOKE CONTROL ORDERS
SUBMITTED BUT NOT YET
CONFIRMED**

Northern

Castle Morpeth No.2; Langbaugh No.1 (Redcar Central); South Tyneside Nos. 5 and 6; Sunderland No.20.

North West

Manchester (Woodland Road Extension); Oldham No.33; South Ribble Nos. 9 and 10; St. Helens No.22; Wigan (Ashton No.3) Wirral No.1 (Mersey) and No.2 (Tranmere).

Yorkshire and Humberside

Barnsley Nos. 26, 27, 28 and 29; Kirklees (Huddersfield) No.14 (Berry Brow); Wakefield (Durkar and Crigglestone No.1), (Featherstone (Snydale) No.2), (Normanton No.4) and (Pontefract No.11).

West Midlands

Walsall No.28 (Dudley Fields); Warwick Nos. 14, 16 and 17; Wolverhampton No.23 (Penn Area); Wrekin No.5.

East Midlands

Ashfield No.9 and No.10.

East Anglia

Peterborough No.8 and No.9.

South East

Dartford No.19.

London Boroughs

Hillingdon Nos. 34, 36 and 37.

SCOTLAND

**NEW SMOKE CONTROL ORDERS
CONFIRMED BUT NOT YET IN
OPERATION**

Renfrew District (Johnstone North); Strathkelvin District (Wester Mains).

NORTHERN IRELAND

**NEW SMOKE CONTROL ORDER
IN OPERATION**

Antrim No.4 (Van No.2).

**NEW SMOKE CONTROL ORDERS
CONFIRMED BUT NOT YET IN
OPERATION**

Belfast CC No.15 and No.16.

HAVE YOU REGISTERED?

NSCA WORKSHOP ON

ENERGY CONSERVATION

1 & 2 April 1980

Sheffield University

Registration:

NSCA, 136 North St.

Brighton. (0273) 26313

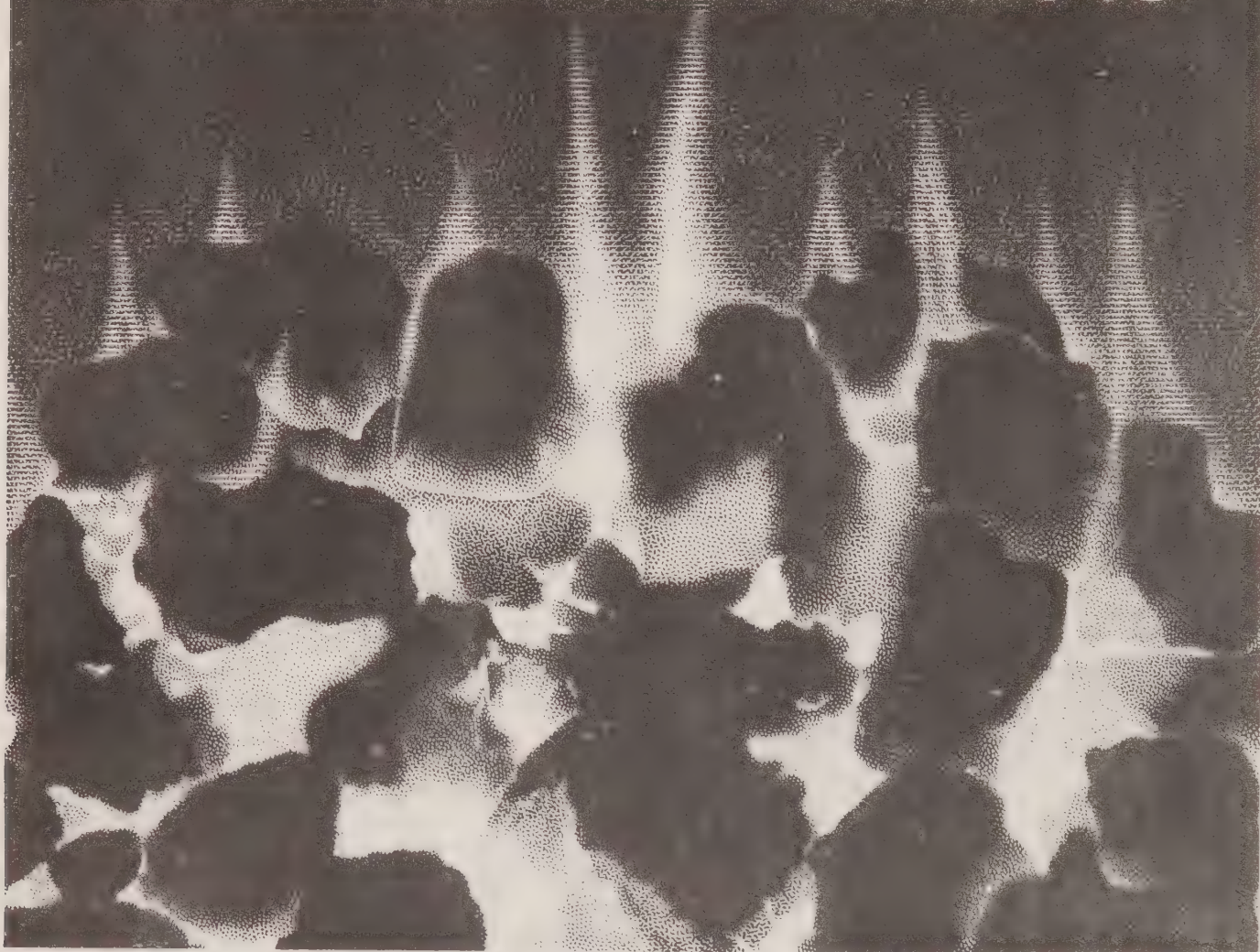
SMOKE CONTROL AREAS

Progress Report
Position at 30th September 1979

(Figures supplied by the Department of the Environment, the Welsh Office, the Department of the Environment for Northern Ireland and the Scottish Development Department).

	England		Wales		Scotland		Northern Ireland	
Smoke Control Areas Confirmed to 30.6.79	5,063	1,757,088	34	3,331	277	155,286	79	18,955
Acres		7,398,040				630,728		56,606
Premises								
Smoke Control Areas Confirmed (1.7.79 - 30.9.79)	24	16,998	—	—	2	823	2	466
Acres		38,843				4,340		1,982
Premises								
Totals	5,087	1,774,086	34	3,331	279	156,109	81	19,421
		7,436,883				635,068		58,588
Smoke Control Areas Submitted (1.7.79 - 30.9.79)	36	17,929	—	—	—	—	—	—
Acres		47,168				—		—
Premises								
Grand Totals	5,123	1,792,015	34	3,331	279	156,109	81	19,421
		7,484,051				635,068		58,588
Smokeless Zones (Local Acts) in Operation	44	3,400	—	—	—	—	—	—
Acres		41,060						
Premises								

So nice to come home to-



a warm welcoming *COALITE* fire

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USE SMALLER CARS, SAYS REPORT

A vigorous campaign backed by fiscal measures, to make new cars more efficient in the use of fuel and to encourage the use of smaller cars is called for in a report* published by the Advisory Council on Energy Conservation. It also says that the use of diesel engines for high mileage cars and light freight vehicles should be encouraged.

Looking at future oil consumption by all forms of transport, the report forecasts an increase of 38 per cent (from 29 million tonnes to 40 million tonnes), by the year 2000, mainly reflecting increased consumption by civil aviation and cars. The forecast allows for the effects of energy conservation and increases in the real price of oil to the consumer. It says 'It is necessary that such prices should reflect movements in the world price of oil, buttressed by increases in fuel taxes. The vigorous pursuit of improvements in the fuel efficiency of new vehicles and the encouragement of an increasing proportion of fuel economical cars in new production may have to be supplemented by fiscal measures. The improvement of driving techniques is also important.

'A switch to diesel powered cars covering high mileage and to diesel powered light vans would be advantageous in energy terms and should be encouraged by Government policies. This requires the restoration, as a minimum, of parity of tax as between petrol and diesel. It is also desirable to accelerate the commercial exploitation of electric vehicles, and notably vans with limited urban mileage, and a greater research effort should be directed to this end'.

* 'Advisory Council on Energy Conservation: Report to the Secretary of State for Energy'. Energy Paper 40.

MICROWAVE OVENS

WARWICKSHIRE ENVIRONMENTAL PROTECTION COUNCIL

The Warwickshire Environmental Protection Council made representations to the Secretary of State to the Department of Trade that microwave oven manufacturers should warn users about the possible dangers arising from lack of maintenance or misuse of their microwave ovens and that this warning should be conveyed by means of a label affixed to the oven.

The Department has replied as follows:

'Microwave ovens come within the scope of the Electrical Equipment (Safety) Regulations 1975 made under the Consumer Protection Act 1961 which, amongst other things, require domestic electrical equipment to be so designed and constructed that, when in use, it does not emit any kind of radiation so as to be dangerous. They also require that where it is necessary for safety reasons for the user to be aware of any particular characteristic of the equipment, this information must be given either on the equipment or, where this is not practicable, in any accompanying notice.

On receipt of your letter, the Department's legal advisers were asked whether this could be interpreted as requiring microwave ovens to carry a

warning about the necessity for regular maintenance. They have now advised that in their opinion the leakage of microwave radiation from a microwave oven in certain circumstances, e.g. inadequate maintenance of the door seal, is capable of being a characteristic about which information should be given in accordance with the Regulations including instructions on cleaning, inspection, etc.

As it is practicable for the warning to be carried on the cooker itself, it would not, in the opinion of the Department's legal advisers, be adequate compliance for it to be in an accompanying document.

The Regulations are at present being revised but, as they must continue to conform to the Low-Voltage Directive, we do not think that it will be possible for the requirement concerning safety advice to be made explicit or for it to cover misuse. Requirements imposed in accordance with the Directive relate only to safe usage of equipment which is properly installed, used and maintained.

We understand that all microwave ovens sold in this country comply with the relevant British Standard which requires ovens made to the Standard to be accompanied by information on maintenance, including a recommendation to the effect that door seals and door seal areas should be inspected periodically and that, if damage is observed, the oven should not be used until it has been repaired by a service technician trained by the manufacturers. We propose to ask the British Standards Institution to consider amending the Standard so as to require suitable warnings to be on the appliances themselves as well as in the accompanying instructions.

We also propose to inform manufacturers and importers of microwave ovens of the legal opinion to which I have referred and to advise them that while only the courts can give a ruling on the interpretation of the Regulations, they would be well advised to arrange for the information we consider to be necessary to be given on the ovens which they sell.

To put the alleged danger posed by microwave ovens in perspective, you may like to know that the National Radiological Protection Board, which advises this Department on the subject, has stated that an exposure of hundreds of milliwatts per square centimetre for more than one hour is required to produce cataracts.

As ovens marketed in this country are well within the limit in the British Standard of 5mw per sq cm at 5cm, there would seem to be a very wide safety margin. Recent claims that microwave radiation can cause cancer have not been supported by any scientific evidence whatever.

Finally, the Department is looking into the possibility of producing a radio tape which would give advice on the safe maintenance and operation of microwave ovens. This would be distributed throughout the country for use by local radio stations in consumer programmes, general interest slots, etc.'

It will be seen that the Department is concerned with the representations made by the Warwickshire Environmental Protection Council and the Council welcomes the progress that has been made towards achieving safety in the usage of microwave cookers.

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INDUSTRIAL NEWS

Europe's Biggest Coal-Fired, Fluidised-Bed Furnace Commissioned at Ketton Cement Works

Sir Derek Ezra, M.B.E., Chairman of the National Coal Board, has officially commissioned Europe's biggest coal-fired, fluidised-bed furnace at the quarry and works of The Ketton Portland Cement Company Ltd., near Stamford, Lincs.

The 50,000,000 Btu/h output furnace, an integral part of Ketton's 7th unit dry-processing kiln, is designed to supply hot gases for the purposes of clay drying. Up to a maximum of 55 tonnes of clay per hour can be 'dried' by the furnace.

The commissioning brings to fruition investigations into the possibilities of commercially applying fluidised-bed tech-

nology to ancillary plant associated with cement manufacturing by Mr. Geoffrey Turner, Ketton's Managing Director. Mr. Turner first began looking at coal-fired plant during 1977, following dramatic rises in the cost of fuel oil; at that time supplied from the Middle East.

Mr. Turner stated, "Our earlier investigations during 1977 into the commercial possibilities of utilising indigenous fuels proved worthy of closer scrutiny. When we finalised our investigations, both from technical and commercial points of view, we decided to invest in a coal-fired, fluidised-bed furnace."

"I would like to emphasise that the project has been carried out in close collaboration with the National Coal Board

and the manufacturers Messrs. G.P. Worsley, who have greatly assisted our development plans."

When in full operation, the fluidised-bed furnace will consume up to 1½ tonnes of coal per hour. The total usage of Ketton Works however, one of the National Coal Board's bigger customers, is in the region of 200,000 tonnes of coal per year.

One of the major benefits of coal-fired, fluidised-bed technology is that it permits the high efficiency burning of low-grade fuels.

The Ketton Portland Cement Company Ltd., is a member company of the Thos. W. Ward Group and 630 people are employed mainly at its quarry and works, Ketton. The company has a manufacturing capacity of approximately 1,000,000 tonnes of cement per annum.

Reader Enquiry Service No. 805

Ventilation Jones Introduces Long Reach PU Spot Extract System

A new long reach spot extract system for localised applications has been added to the range of equipment offered by Ventilation Jones. Called the PU system, it is ideal for both fume and dust extraction and can be used for jobs up to 9m away from the mounting point. Suggested applications include welding booths, glass reinforced polyester (G.R.P.) workshops, and metal grinding areas.



The PU system can be installed in either multi or single station form according to specific needs.

It incorporates a powerful paddle blade centrifugal fan to provide suction, and is fitted with a choice, or selection, from a series of glass fibre fabric hoses. These reach to 2.5m, 5m or 7.5m.

Each hose is suspended overhead by a matching, hinged articulating arm, that is mounted on a pivoting bracket to give a 180° arc of travel. This ensures complete flexibility regarding extract nozzle location to serve work areas of 10m², 40m² and 90m², respectively.

Another feature is a pliant plastic nozzle that can be twisted and angled in any direction to be accurately positioned to suit a particular job or method of working.

Multi extract hose installations are intended for those applications where continuous extraction is required for a bank of work stations. The single hose units, when supported by long reach arms, are particularly useful for intermittent operation in different locations within a workshop, or for following progressive work, such as g.r.p. boat fabrication.

Ventilation Jones is a company specialising in the marketing and installation of extraction and ventilation equipment for numerous industrial applications.

Reader Enquiry Service No. 806

Automatic Weather Station

A fascinating box of tricks which logs weather patterns and automatically transmits the information to a display terminal has been developed by Vaisala Oy of Finland. Called the "Milos", it is a micro-computer-based weather station which is housed in a small fibreglass case for on-site installation. Up to 9 sensors can be connected and are simply plugged into the back panel.

The station automatically measures, processes and records realtime data on temperature, wind speed and direction, humidity, atmospheric pressure, solar radiation, rain amount, precipitation and sunshine.

The Milos produces a weather message on-site with the data already scaled to meteorological units and ready for distribution. The data can be transmitted over the public telephone lines or VHF radio either automatically or through interrogation. A magnetic recorder logs 6 months of meteorological data on a single cassette. The remarkable unit can be connected to a print-out terminal, CRT display, closed circuit TV network or computer



Power consumption is only 1 watt when all sensors are connected. In remote locations batteries or solar cells are used to provide power.

Reader Enquiry Service No. 807

Surrey University's Contribution to New Type of Dust Filter

The University has played a major part in the development of a remarkable new type of filter for removing dry dust from gas in power stations, chemical works and other medium to large industrial applications. Known as the Becodex system, it has just been launched on the market by Begg, Cousland Ltd. of Glasgow. Its efficiency and compactness are likely to be major factors in containing the pollution of the environment by air-borne dust from industrial sources.

Conventional industrial air filters work in a manner not unlike a domestic vacuum



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Reader Enquiry Service No. 808

cleaner in reverse. Dust-laden air is fed into a chamber containing suspended bags made of filtering material. The air is drawn through the material into the bags, from where it can be discharged to the atmosphere. The dust collects on the surface of the bags. At intervals the air flow is stopped and the coating of dust is removed by mechanical shaking or by reversing the air flow. These processes are not particularly efficient and also tend to wear out the bag material prematurely.

The Becodex system works on an entirely different principle. Each filtering unit consists of a sloping shallow box, whose upper and lower surfaces are covered with a suitable filter material, such as the newly developed needle felt/teflon laminate called Goretex. The air is sucked into the box and then pumped away, the dust remaining on the outside of the box. The filtering units are mounted one above the other in a stack; this makes it possible to provide a large area of filter within a small floor space — an arrangement very similar to that of the gills of fish.

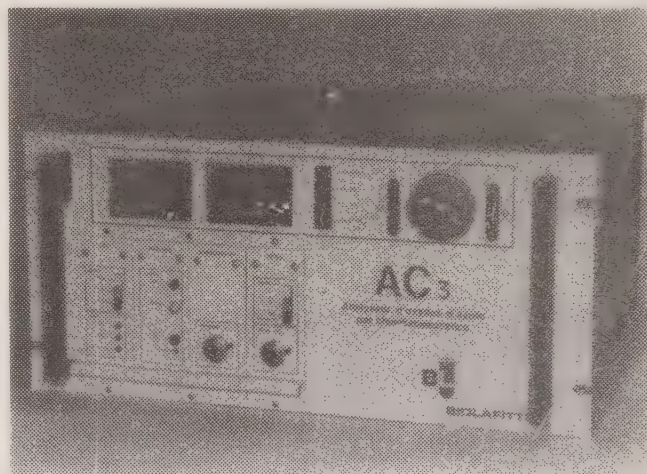
When the filtering units are ready for cleaning, the dust is removed, not by the conventional shaking process, but by a high-frequency small-amplitude vibration similar to that used for some industrial conveyors of fine particles. The dust particles move down the sloping upper surface of each box and fall off the edge. Those on the lower surface fall on to the upper surface of the box below and are similarly transported to the edge. This method of cleaning is a great advance on conventional methods because vibration of the whole surface of the filter gives far more effective cleaning, and the small amplitudes of vibration (around 1mm) cause far less damage to the filter material.

This combination of compactness, efficiency of cleaning and design flexibility is a substantial advance in air filtration technology.

Reader Enquiry Service No. 809

Air Pollution Monitoring Equipment

Environment S.A. are about to launch their complete range of air pollution monitoring instrumentation in this country.



The equipment, manufactured to high engineering standards and using current analytical techniques, ranges from relatively simple dust samplers to complete air pollution monitoring stations. Units include:—

SO₂ (strong acidity), specific SO₂ (UV fluorescence), NO/NO_x (chemiluminescence), CO, total hydrocarbons, automatic gas calibration systems, O₃ generators and analysers, air and dust samplers, heated sampling pipes, dataloggers, transmitters and processors.

Reader Enquiry Service No. 8012

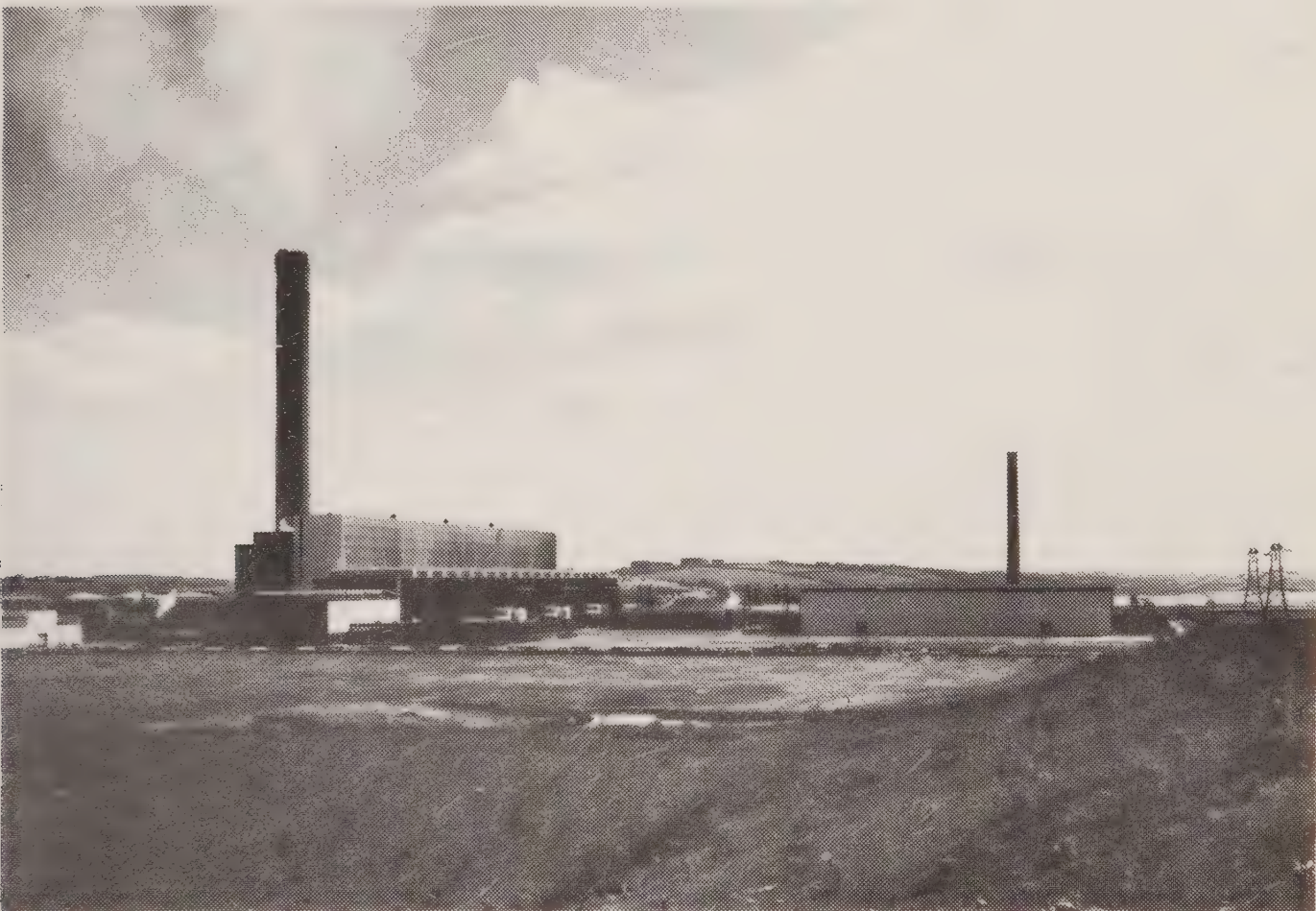
F.E. Beaumont Ltd.

F.E. Beaumont Limited of Mere, Wiltshire has received an order valued at over £800,000 from GEC Gas Turbines Limited for the manufacture of four 64m high x 4.6m diameter self supporting steel chimneys to be erected at Castle Peak Power Station, Hong Kong. The chimneys each take the exhaust from one of GEC's 70 Mw EM 610 industrial gas turbines.

Reader Enquiry Service No. 8013



Caring for the environment



The Central Electricity Generating Board has received more than 40 Commendations and Awards for environmental schemes at power stations, substations and associated nature trails and field study centres in England and Wales. They include the Arnold Marsh Clean Air Award, two Prince of Wales Awards, four from the Business and Industry Panel for the Environment, six RICS/Times Conservation Awards and nine Wales in Bloom Awards.

Central Electricity Generating Board

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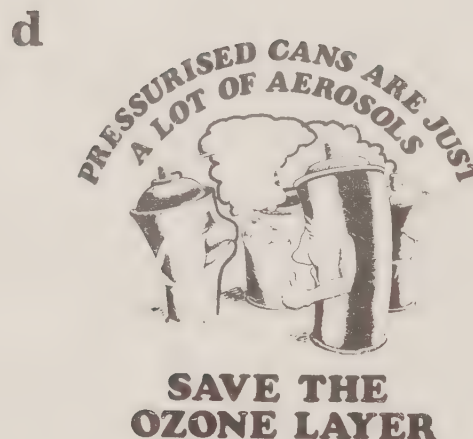
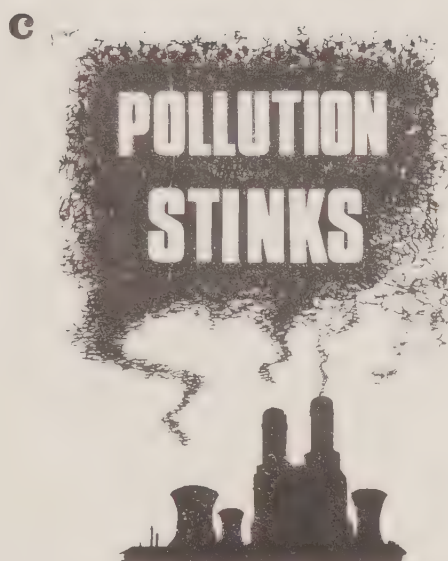
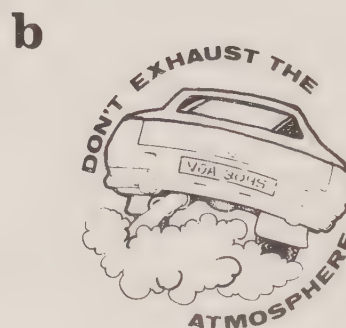
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LEAD AND HEALTH

The Report of the Department of Health and Social Security Working Party on Lead in the Environment, set up in December 1978 under the Chairmanship of Professor P.J. Lawther, was published on Friday, 28th March 1980. The report is entitled "Lead and Health" and a brief summary is contained in another part of this journal.

The first thing of significance is that the Report covers the whole subject of lead and health, and not as many people expected, the particular aspect of lead in air and more especially lead in air caused by lead additives in petrol. It was therefore not altogether surprising that, during the press conference at which the report was launched, no questions at all were asked about lead in food and lead in water although the report clearly indicates that these sources are responsible for more lead in the environment than lead in air from whatever source. However, lead in air, particularly lead in exhaust fumes, was the main interest and it can only be said that the report proves somewhat disappointing in that its findings on this subject are rather inconclusive. In fact, it may be said that the Report does little if anything to change the position from what it was before the Working Party was set up. On the other hand, Professor Lawther made it quite clear at his press conference that this report was produced by a Committee of doctors and scientists whose task was to produce a scientific and not a political report. It was their aim to present the facts as they found them and not to draw conclusions which were not based on scientific evidence. The report, therefore, does no more than recommend that in the light of the vast amount of evidence which the Working Party considered, it would be prudent to reduce the lead levels in air caused by lead in petrol, either by reducing the amount of lead additives in petrol — something which in fact has been going on for some considerable time — or by using suitable lead traps on motor car exhausts.

Whether any action is taken as a result of this recommendation remains to be seen, but the Minister concerned has indicated that the Government will look very closely at the recommendation and consider what action, if any, should be taken. So the matter now becomes one for political decision. This Society has always taken the attitude that lead in the air should certainly be reduced if it could be shown that the lead in air was a danger to health. But if it could not be shown incontrovertibly that lead in air was dangerous, nevertheless it would be prudent to reduce the amount of lead in petrol progressively.

The Lawther Report produces no incontrovertible evidence that lead in petrol is dangerous to health; but neither does it present incontrovertible evidence that it does no harm to anyone. It would therefore seem not only prudent, but essential, that the Government should speed up the programme for the reduction of lead in petrol and should announce a firm timetable by which the levels are reduced to comparability with those allowed, for example, in West Germany.

P.G.S.

SALE OF PRE-PACKED COAL IN SMOKE CONTROL AREAS

Two letters to the Editor (*Clean Air*, Vol. 9, No. 3) raised the thorny question of the sale of pre-packed bituminous coal in smoke control areas. Corner shops, chemists and garages are known to offer bags of bituminous coal for sale over the counter in many areas where smoke control orders are in operation. It is an offence for anyone to buy or acquire any unauthorised solid fuel with the intention of using it in a building in a smoke control area and it is an offence knowingly to sell any unauthorised solid fuel for use in a smoke control area (this does not apply to fuel for use in an exempted appliance). It is not, however, an offence simply to sell bituminous coal over the counter in a smoke control area.

Legal Loophole

The legal loophole and stumbling block in dealing with the problem has always been that, although the pre-packed bituminous coal is available for sale in a smoke control area, it could not be assumed that it would be used in a smoke control area. It has frequently been suggested that the zone of sale is wider, with people stopping their cars to buy coal for use outside the smoke control area. Against this, it can be argued that in cities such as Newcastle where smoke control is complete, such trade would be unlikely.

NSCA Survey

This loophole in the law has created difficulties for many local authorities, as explained in the letters from M E Paddock of Birmingham City Council and C R Cresswell of Newcastle upon Tyne. In Newcastle, smoke control is complete but in 1979 there were 98 retail shops selling pre-packed bituminous coal in a mixture of 28 lbs or 10-12.7 kg bags. The Society's Northern Division raised the matter and it was referred to the Society's Parliamentary and Local Government Committee. The Honorary Secretaries of all Divisions were circulated to find out the extent of the problem. Information received from the Divisions indicates that the problem is widespread in local authorities in the North, North-West, Yorkshire and Humberside, East Midlands and West Midlands areas.

Unmarked Bags

One of the difficulties is that pre-packed bags of bituminous coal are not always clearly marked "unsuitable for use in a smoke-controlled area". Packers buy in a stock of bags which might last them for a number of years and a smoke-control order might have been brought into operation before the stock of unmarked bags is exhausted. Another difficulty is that there is no requirement for the proprietors of corner shops to display a notice with a warning that some of the fuel sold over the counter is not smokeless fuel. Some local authorities have printed a notice with such a warning and circulated it among retailers with the request that it be prominently displayed. The notice produced by Wirral Borough Council reads:

WIRRAL BOROUGH COUNCIL
PRE-PACKED COAL (e.g. TREND) IS NOT SMOKELESS FUEL
THE PROPRIETOR WILL GLADLY ADVISE YOU OF SUITABLE
AVAILABLE SMOKELESS FUELS

Of course, the law provides for a penalty in the event of anyone actually causing smoke to be emitted from a chimney in a smoke control area. And there are penalties for any merchant acting in breach of the Act. Local authorities prosecute in both instances but, as Colin Cresswell pointed out in his letter, "Numerous merchants and householders have been prosecuted and, in the case of the former, this has acted as a deterrent. However, with householders, the very number involved makes the use of court action less valuable, although the local court has stepped up fines recently".

When the results of the NSCA survey were known, the Society's Secretary General discussed the whole matter with Mr J M Brown of the Approved Coal Merchants' Scheme (ACMS). The Approved Coal Merchants are trying to ensure that any coal, or solid smokeless fuel for that matter, sold through retail outlets, is sold in suitably marked bags. However, the old stocks of unmarked bags, referred to above, are the difficulty. Mr Brown agreed to get in touch with his area organisers and with merchants who are members of the scheme and impress on them the necessity for using properly marked bags. He considered that if this practice is adopted, then the onus of complying with the law is placed on the purchaser.

Change in Legislation?

The NSCA's Northern Division, and several authorities responding to the NSCA survey, have urged a change in legislation to close the loophole. It would appear to be perfectly feasible to forbid the sale of bituminous coal in areas which are completely subject to smoke control, but there would be difficulties where some parts of the town were subject to smoke control and others were not.

One way out of this would be the extension of smoke control to cover all urban areas!

Improvements through Cooperation

Whether changes in legislation are practical or not, the immediate answer would seem to lie in closer co-operation between local authorities, the Society and the ACMS. The Society's Secretary General would be glad to hear from any members, notably local authorities, about problems with bituminous coal being sold in unmarked bags. The Society would then inform the ACMS about areas in which there is difficulty. The Society's Northern Division have already been in touch with the local Secretary of the Approved Coal Merchant's Scheme, and from the latest survey it appears that there has been an improvement in the position. Close co-operation might achieve similar results in other parts of the country. The other measure that could be taken now is for local authorities generally to adopt the practice of issuing a suitable notice to corner shop retailers in smoke control areas. The public may well need reminders about the law and about the type of fuel which is acceptable under the law.

EDITOR'S NOTE

The paper 'Energy Conservation in Industry' by Harry Brown (pages 41-44) was prepared for presentation at the 1980 NSCA Workshop on Energy Conservation. This event was cancelled because of lack of support but we still feel that the subject is of great importance and interest and we hope to publish other papers intended for the Workshop in future issues of *Clean Air*.

ENERGY SAVING IN INDUSTRY

by

Harry Brown

C.Eng., M.Inst. Gas E., F.Inst.E, F.I. Plant.E
Energy and Resources Consultant

INTRODUCTION

During the Second World War, the Ministry of Fuel and Power set up a nationwide team of fuel engineers to advise on ways in which fuel consumption could be reduced. The Clean Air Act of 1956 resulted in improved domestic appliances being made available for use with approved fuels in smokeless zones. The reduction of smoke depended upon improved combustion techniques which if correctly applied resulted in reduced fuel consumption.

The third major event which involved national interest in the reduction of fuel consumption was the first of the major increases in crude oil prices during 1973/74.

During the thirty years between these events the Mossadeq crisis, the Suez crisis and various strikes at home resulted in spasmodic efforts to reduce consumption which in most cases were short lived.

For the last seven years, a continuous effort by the Department of Energy, supported by interested parties, institutions and individuals, has followed the continued increases in oil prices. The increasing importance of energy availability as an international economic weapon leaves, or should leave, no doubt in anyone's mind that energy waste can no longer be tolerated.

THE INDUSTRIAL SITUATION

The position tables for the value of trade between the world's leading industrial nations indicate the reduced competitiveness of many of the industries of the United Kingdom. Nevertheless, emphasis must be laid on the fact that some of our industries are not only highly competitive but are world leaders in their field. If this can be achieved in some cases there is reason to suppose that the possibility exists in many others. When products are well designed and correctly presented by a dedicated marketing force, it is essential to apply efficient techniques to the manufacture of the article to allow it to be sold at a competitive price.

The cost of raw materials is mainly governed by overseas markets. Labour costs are rarely controlled by individual manufacturers. Plant renewals are costly, and there is a tendency to 'make do and mend' for as long as possible.

Thus, the only recourse to the industrialist in his effort to reduce costs must be to use plant, raw materials and his labour force as efficiently as possible.

Fuel is probably the only resource which lends itself to significant cost reduction methods in the generation and utilisation of energy within a factory.

ATTITUDES

When fuel prices are increased there is an outcry which results in prices of finished goods being increased. The importance of these costs is emphasised as significant within the price structure.

When, however, attempts are made to persuade many firms to institute a campaign for the saving of energy, it is usual, outside the energy intensive industries, to hear that fuel costs are such a small proportion of turnover as to preclude such an effort. Any capital expense involved is stated to be better utilised in the provision of production plant.

It is, however a simple economic fact that money not spent is a direct tax free, trouble free contribution to nett profits.

The Watt Committee on Energy(1) have assessed potential fuel savings to amount to 30 per cent of consumption. A large proportion of this can be achieved with little or no expenditure. Thus, where a firm pays a dividend equal to 5 per cent of turnover every £1 paid must be backed up by £19 of buildings, management, equipment, labour, transport and sales effort. Every £1 saved in energy costs needs little if any such effort.

Furthermore such contributions are inflation proof in that savings, if maintained by good housekeeping, become more valuable with every fuel price rise.

The prevalent attitude that 'they' will invent something or that nuclear energy and solar energy will solve all problems is 'pie in the sky' so far as the foreseeable future is concerned. To hold these views, as many do, is completely incompatible with the view almost universally held that money spent on fuel saving methods must show a 'normal commercial return on capital'.

Fuel prices are not controlled by a normal commercial market; therefore abnormal commercial methods must be adopted to ensure the continuity of supply, and therefore the survival of the business, at the lowest cost per unit of production.

AVAILABLE TECHNIQUES

The hackneyed word 'technology' seems to indicate some new method of operation. The technology for energy saving is over 200 years old and only requires to be put into service and continually monitored.

Over the years the methods have assumed the role of 'cliches' and as such, are taken for granted but not acted upon.

An audit of all energy using equipment is the first essential step, not forgetting the primary need to record actual fuel consumption, not just deliveries at weekly or other convenient intervals. It is only then that a more detailed analysis can take place.

FUEL/ENERGY CONVERSION

The only form of energy which is purchased directly by any firm is in the form of electricity. All other forms of energy must be processed in the factory from purchased fuel. This conversion of fuel to energy is normally effected in boilers, furnaces, air heaters

or by direct conversion in liquid heating vats. Just as the international traveller will ensure that he obtains the best value in foreign currency for his pound sterling, so is it important that the user gets the best exchange value for his purchased fuel.

Boilers must be operated at maximum efficiency. It is not enough, however, to take spasmodic tests of combustion conditions and be satisfied with an 80 per cent result. Such combustion efficiencies can be devalued, and often are, by operating one or more boilers under low load conditions either for insurance against a failure of a boiler or by using more boilers than necessary.

Every boiler needs a certain amount of fuel to keep itself warm and the use of more boilers than necessary for a given load is a direct waste.

It is not enough to shut off the fuel supply to an unused boiler unless the heating medium, be it hot water for space heating, or steam for process use, is shut off. If a boiler is kept under fire 'just in case' the peak load is beyond the capacity of the operational boiler, then the reason for the peak load should be investigated.

Where boilers are operated with unnecessary standby facilities it is possible to obtain overall plant efficiencies of 60 per cent against 80 per cent to give 33 per cent waste of energy. This situation is a very common practice. Therefore the necessity for any boiler to be used as standby should be seriously investigated.

Boiler heating surfaces should be kept clean on both fireside and waterside to ensure good heat exchange. Boiler water feed tanks should be insulated and their tops covered to ensure minimal heat loss. If trouble is experienced with pumping hot feed water the feed tank should be lifted to give adequate head, normally 10 ft. or 12 ft. above the feed pump suction.

Similarly, the use of fuel for furnace heating should be monitored, not only in terms of combustion conditions and temperature levels, but in terms of the effectiveness of loading. This applies particularly to departments where large numbers of small furnaces are available for use. Serious attempts should be made to organise the work schedules to prevent furnaces being kept under fire for long periods with no material being processed.

With larger furnaces, the practicability of recovery of heat from waste gases should be considered. The main problem in this connection is usually the finding of useful work for heat so recovered. Water heating for process or sanitary use provides a fertile area of investigation as a contribution to space heating by warm air or water circulation. This type of utilisation is often rejected on the ground of distances to be travelled or cost of equipment but as in all other cases the cost of the work should be assessed against benefits to be obtained.

The preheating of air to burners is a profitable exercise and the provision of new burners with such a facility is often a worthwhile investment.

ENERGY UTILISATION

The use of energy in furnace work is carried out simultaneously with the combustion process in most cases, but energy generated in boilers is used as a secondary conversion in a multitude of processes. Losses must then occur in transportation and in the equipment

used in the many processes involved. In all cases, pipes and other hot surfaces must be adequately insulated.

The condensate from the pipelines and process equipment must be removed by effective and well maintained steam traps. Standby or non-productive periods must be reduced to a minimum and steam supplies shut off where not required.

Optimum temperatures should be determined for the processes concerned and urgent steps taken to ensure accurate control. One old battered dial type thermometer is not enough in view of the losses which can be incurred by overheating by only 1°C. If cold water is heated to 80°C for process work, a 1°C overheat = 2.33 per cent fuel waste at a generation efficiency of 60 per cent. Heating to 50°C would show a loss of 4.16 per cent under the same circumstances. Surely, stringent control is justified.

Where waste liquor is passed to the drain after being heated, consideration should always be given to recovery of heat. In the above case, water rejected at 80°C could provide preheat to the same quantity of incoming water of over 50°C to show a further saving of 57 per cent in fuel originally required for the process. If, however, the boiler efficiency were raised from 60 per cent to 80 per cent at the same time, the fuel required would be reduced by 67 per cent. Under similar conditions a 1°C reduction in space heating temperatures would reduce the fuel bill by 9.5 per cent over the year.

Such is the scope for fuel savings, and to a greater or lesser degree they exist in all factories no matter how efficient they may be, nothing being perfect.

ECONOMICS

At this stage the question of capital costs which may be involved is inevitably raised. It is only when a detailed assessment based on measured data is available that economics can even be considered.

Very often, substantial savings can be made by simple but sustained, no-cost adjustment; but in other cases a detailed study is required. The number of firms capable of making such a study is very limited and Energy Managers and all concerned with energy use, and that is all of us, should take steps to quantify and rectify energy waste. Outside help should be recruited for this purpose.

EDUCATION AND MOTIVATION

Where such steps as outlined above are not implemented it can only be deduced that awareness of the situation is lacking. How can firms claim that they are short of money when part of their money is used to finance waste?

There is, therefore, a clear need to educate and motivate energy users to delay the time when money will not buy energy.

The Watt Committee on Energy is playing its part with and through its constituent Professional Associations, along with the National Society for Clean Air, to supplement the Government's own efforts.

REFERENCE

1. The Rational Use of Energy. Publication No. 3. The Watt Committee on Energy, Ltd. 75 Knightsbridge, SW1X 7RB.

LEAD AND HEALTH. LAWTHER REPORT

The Working Party on Lead, chaired by Professor P.J. Lawther, was set up in December 1978 to review the overall effect of environmental lead on health, particularly the health and development of children, and to assess the contribution of lead from petrol engine exhaust. The Working Party concentrated on the evidence from human populations; although the extensive literature on clinical lead poisoning was considered, the report does not cover this work or experimental work on animals and biochemical mechanisms. In particular, the Working Party examined the possibility that more subtle adverse effects on health and development might result from the chronic absorption of lead in smaller quantities than those known to give symptoms or signs and hitherto thought to be without effect.

The report deals in sequence with the several sources of lead in the environment (in food, water and air) and with the relative importance of each of these to the total uptake of lead. In round terms, it is calculated that adults living in cities, not especially exposed to lead, derive 45 – 90% of their blood lead from food, 0 – 45% from water, and 10 – 20% from air. Data on blood lead concentrations in representative samples of children who are not especially exposed to lead are not available so the calculations in the report are based upon estimates of absorption rates. Again, in round terms, it is suggested that children living in cities derive 55 – 95% of their blood lead from food, 0 – 40% from water and 3 – 10% from air. The lower proportion from air compared with adults depends upon the assumption that rates of absorption from the intestine are very much higher in children than in adults.

In 1979 the Department of the Environment co-ordinated a number of blood lead surveys in different areas of the country in fulfilment of an EEC Directive on the Biological Screening of the Population for Lead. The provisional results are reproduced in the report. (Annex 2). They show that blood levels in the bulk of the population come within the requirements of the recent EEC Directive, but that a small minority have high concentrations through exposure to a variety of sources, or from a specific hazard. The report recommends that particular attention should be paid to individuals, especially children, whose blood lead concentrations are found to be over 35 $\mu\text{g}/\text{dl}$.

Recent studies, notably from the USA, have suggested that lead levels of around or even below this figure might interfere with mental development or cause behavioural disorders in children. The Working Party considered many such studies, the quality of which they found to be varied, but could not find conclusive, unambiguous evidence that small amounts of lead impair the intelligence and behaviour of children. "There is no convincing evidence of deleterious effects at blood level concentrations below about 35 $\mu\text{g}/\text{dl}$ We also have no doubt about the neuropsychological consequences of high concentrations of blood level. Symptoms of lead poisoning and encephalopathy occur with levels in excess of, say, 80 $\mu\text{g}/\text{dl}$ It is therefore in the range of blood lead concentrations between 35 – 80 $\mu\text{g}/\text{dl}$ that doubt remains."

Chapter 4 of the report examines lead from air, dealing in particular with lead in petrol, the major (90%) source of airborne lead. The Working Party found it difficult to estimate true exposures to airborne lead in view of the large variations in concentration that may occur over short distances, and the extent to which most people move around

during the day. "There may be some exceptional circumstances in which individuals are confined to a locality with relatively high concentrations, but few people are likely to be exposed to long-term average concentrations greater than about $1 \mu\text{g}/\text{m}^3$ Concentrations of lead in the air inside houses are generally similar to, or a little lower than, those immediately outside."

The report refers to the contribution of airborne lead to deposited dust, saying that much of the lead in street dust is the result of the fallout of airborne lead but some may also come from weathering of lead paint on houses, street fittings or yellow lines on the road. Lead in air and dust also contributes to lead levels in food, and may permanently contaminate soil, may be taken up by plants, or may be blown on to food and crops. The report concludes that street dust must contribute to the amount of lead ingested, particularly by children. "Vegetables grown near roads and industrial sources are liable to retain lead deposited on their leaves; in addition the continued fallout year by year of lead from the air on to the ground will increase the concentration of lead in soil and may increase the uptake of lead by plants. The importance of each of these possible pathways is not known but they must add somewhat to the effects of inhaled airborne lead."

Pointing out that the mean difference in blood lead concentrations between dwellers in inner and outer city areas as indicated by the EEC Surveys is $1.8 \mu\text{g}/\text{dl}$, the report says that this is slightly more than would be predicted from the likely differences in air lead. These city dwellers are not subject to major industrial emissions of lead, and the Working Party believes that dust derived from lead paint blowing on to food which is insufficiently cleansed before being eaten could be an additional source. Although the contribution of dust and other adventitious sources to the exposure of the population as a whole is not known, the Working Party have "found no reason to conclude that it is a major factor".

The Working Party concludes that for most people in the UK the uptake of lead from air is of a low order and generally much less than that from food and water, but that doubt remains about the form of the relationship between air lead and amounts in the blood:

"There are some 'hot spots' where long-term average concentrations may be as high as $6 \mu\text{g}/\text{m}^3$; continuous exposure to such air lead concentrations may well make air lead the major contribution to uptake for some individuals."

It recommends that further monitoring of lead in air should concentrate on identifying 'hot spots' and that the extent of the increase in blood lead which results from long-term exposure in such circumstances should be investigated. The Working Party also recommends that emissions of lead to the air from traffic and other sources should be progressively reduced, subject to an appraisal of any other possible effects on health of altering the constituents of petrol. Measures should be taken to keep the annual mean concentration of lead in air to less than $2 \mu\text{g}/\text{m}^3$ in places where people are liable to be continuously exposed for long periods. These measures may include the reduction of emissions, the relocation of industry or housing, or traffic management schemes.

Other main recommendations of the Working Party are:

- Priority action in the few areas with very high lead levels in tap water, where present chemical treatment is insufficient. If necessary old lead plumbing should be by-passed or replaced, especially where the tap water may be used in infants' feeds. People in these houses should also avoid drawing the first run-off for drinking water or cooking.

- Investigation of the lead levels in old paint coatings accessible to young children, especially in depressed inner city areas. Paint used for houses, schools and play areas to contain as little lead as technically possible, (it is already severely restricted) and industrial paints to be labelled for lead content and suitability. Education of parents and health workers about domestic lead hazards, including the dangers of pica (the tendency of some children to eat substances other than foods).
- Warnings about the private importing of lead-bearing eye cosmetics from the Indian subcontinent. Hair care preparations containing lead should state this and carry a clear warning. Maximum vigilance over lead-painted toys.

Mr Patrick Jenkin, Secretary of State for Social Services has said that he and his colleagues will consider the recommendations in the light of the evidence assembled by the Working Party and of the practical and economic factors that must be taken into account, and that this process would be undertaken with all practicable speed.

Lead and Health. The Report of a DHSS Working Party on Lead in the Environment. Department of Health and Social Security. HMSO, March 1980, £4.50, 129 pages.

CENTRAL GOVERNMENT CONTROLS OVER LOCAL AUTHORITIES

As a result of representations by the NSCA and other bodies, the Government have agreed to retain rights of appeal "in general" under the Clean Air Acts 1956 and 1968, and s.81 of the Control of Pollution Act 1974. The Local Government Bill is causing controversy on many grounds, and is still in the Committee stage, so further changes are likely.


Our information (March 1980) is that the following provisions of the Acts are to be retained:

Clean Air Act 1956, s.6(4) & (5)	Appeal against refusal to approve arrestment plant
Clean Air Act 1956, s.10(3)	Appeal against refusal to approve chimney height
Clean Air Act 1956, s.21(2)	Appeal against refusal of exemption
Clean Air Act 1956, s.31(6)	Power to settle dispute over which district should deal with particular premises
Clean Air Act 1968, s.4(5)	Appeal against refusal of exemption from arrestment plant requirements
Control of Pollution Act 1974, s.81	Appeal against notice requiring information, and power to make regulations as to such appeals

It also appears that the following provisions of the Acts will be abandoned:

Clean Air Act 1956, s.6(3)	Call in of classes of applications for approval of arrestment plant
Clean Air Act 1968, s.3(5)	Call in of applications
Clean Air Act 1968, s.4(3)	Prescription of form for application for arrestment plant exemption

IT'S TIME HE HAD THE BRUSH-OFF.



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LETTER TO THE EDITOR

Dear Sir

It was with great interest that I read your editorial in the December issue of *Clean Air*, where you discussed the role of modern pollution monitoring equipment in local government enforcement of air pollution legislation. While there may be a need for such equipment in the eyes of those involved in the work of air pollution control, the view does not seem to be shared by others responsible for finance.

During the last year I have tried to initiate a major research programme on the role of modern pollution monitoring equipment in the work of Environmental Health Departments. One of a number of features of this research proposal was an assessment of the value to local authorities of data produced by modern equipment used in investigations of their current problems. Clearly, we would also have been able to identify if retraining programmes would be needed to help in interpreting data in terms of current or future guidelines. Unfortunately, the Science Research Council did not consider this investigation worthy of support.

A separate issue involved an attempt to set up a service for many local authorities in the Midlands area. Air pollution problems would have been investigated by modern techniques but at a nominal charge, because clearly normal consultancy fees preclude the routine use of expensive facilities for all but the most difficult problems. It was considered that this proposal could offer an efficient use of resources, because the air pollution monitors are expensive and each is selective to one pollutant. Thus each local authority cannot justify having its own range of equipment because it is unlikely that it would be in optimum use, and the cost of this multiplication of resources would be great. However, the Department of the Environment did not wish to support such a plan.

It now seems that each local authority must continue trying to develop its own facilities without any rational plan to share resources or co-operate as these proposals would have offered in line with the recommendations of the 5th Report of the Royal Commission on Environmental Pollution.

Yours faithfully

Dr R S Barratt

Lecturer in Environmental Health,
University of Aston in Birmingham

Dr ALBERT PARKER, CBE

We deeply regret to announce the death, on Tuesday April 1st 1980, of Dr Albert Parker, CBE, Vice President of the National Society for Clean Air and a former President of the Society. Dr Parker, who has been in poor health for some time, was 87. A funeral service was held at St Mary's Church, Rushden, near Buntingford, Herts, on Saturday April 5th, at which the Society was represented by Dr and Mrs S.R. Craxford. An obituary will appear in the next issue of *Clean Air*.

ENVIRONMENTAL IMPACT ASSESSMENT

National Society for Clean Air's Response to Latest Proposals (Preliminary Draft Directive EIE/OU/18)

The European Commission is currently trying to finalise the text of a draft directive on environmental impact assessment (EIA).

The proposals would oblige prospective developers, public and private, in the Member States to submit to the relevant authorities a file of information containing details relevant to the potential impact on the environment of their project, when they apply for planning permission. Where a development might have an effect on the environment of another Member State, the file of information would also be supplied to the relevant authority of that Member State.

The 1973 and 1977 Action Programmes of the European Communities on the environment emphasise the need to prevent the creation of pollution or nuisances at source rather than subsequent action to try to counteract their effects, and the EEC's environmental board has given priority to the introduction of impact assessment. However, previous preliminary draft directives produced in the past two years have failed to win the support of all Member States.

The UK Government's general reaction to the proposals has been that while not opposed to use of EIA methods in the appropriate circumstances, it is against superimposing an inflexible requirement for compulsory environmental impact assessment on our planning system. On that basis UK representatives have criticised the Commission's earlier proposals as being indiscriminate, rigid, and unsuited to our planning system.

The latest EEC proposals, contained in EIE/OU/18, mark a significant shift from previous preliminary drafts. Whereas the Commission had wanted virtually all new developments of any scale to be subject to impact assessment, it now suggests a two-tier system giving Member States much more discretion about which schemes should be assessed and whether a full-blown assessment should be carried out.

Generally the Society strongly supports the broad concept of Environmental Impact Assessment as set out in this preliminary draft and welcomes the idea that there should be an accepted system in operation throughout all Member States. In other words, the Society believes very strongly that prevention is better than cure. However, the detailed procedure, as laid down in EIE/OU/18 is somewhat cumbersome; some NSCA members have expressed fears that the adoption of a Directive, as set out in this preliminary draft, would not only add to the burden of bureaucracy but also increase delays which are already a severe problem in planning procedure.

It is essential that the whole of this subject be kept in proper perspective. There would seem to be a need for detailed analysis only where the potential impact of a specific development is likely to be significant. Early liaison between the developer and the "competent authority" is essential.

The appeals procedure is by no means clear and it is felt that this should be specifically stated. Obviously there is a need for such a procedure where an irreconcilable difference of opinion arises between a prospective developer and a "competent authority".

A minority view has been expressed that in this country the present UK planning system is adequate providing that the appropriate local authority environmental health departments are always consulted. From evidence presented to the Society it is clear that although this is the ideal, it is by no means always carried out, and there is strong support for the suggestion that such consultation should be made a statutory requirement.

Finally, it could be very difficult for a "competent authority" to decide whether or not a proposed development might have an effect on another Member State. For example, how surely and quickly could the effect of any particular airbourne pollutant be determined? Current scientific evidence would have to be taken into account in such decisions, but in some areas research is inadequate or findings are conflicting. □

CLEAN AIR

Journal of the National Society for Clean Air

REQUEST FOR ARTICLES 1980/81

Clean Air is published bi-monthly (end of February, April, June, August, October, December) and is sent free to members of the National Society for Clean Air. Individuals, libraries and booksellers in the UK and overseas subscribe to the journal. Clean Air is now in its tenth volume, and the Society previously published its journal under the title *Smokeless Air* from 1929 to 1971.

We are particularly interested in publishing articles on:

air pollution: surveillance, methods of measurement, modelling studies, controls (technical and legislative), and effects.

noise: (transport, machine, neighbourhood etc), surveillance, methods of measurement, modelling studies, controls, effects.

If you would be willing to provide an article of between 2500-4000 words, together with b/w photographs and/or diagrams as appropriate, please contact the Editor, to give some idea of your chosen subject matter and the nature of the article.

We are also interested in news, developments in the field of atmospheric pollution and noise, current research and applications of research, accompanied if possible by b/w photographs and/or diagrams.

Copy to Editor (typed, double-space) is required by the first week of January, March, May, July, September, November. Please note that *English* is the preferred language for contributions to the journal.

47th CLEAN AIR CONFERENCE

22-25 SEPTEMBER 1980 BOURNEMOUTH

OPENING SESSION
MONDAY, SEPTEMBER 22 — 2030

WELCOME and **OPENING** by the Mayor of
Bournemouth
KEYNOTE ADDRESS

COMMUNITY RESPONSE TO NOISE

C.R. Cresswell,
*Environmental Health Officer, Newcastle upon
Tyne*

SESSION TWO
TUESDAY, SEPTEMBER 23 — 0930
**ENERGY AND THE FUTURE ENVIRONMENT—
GAS**

W.R. Probert,
Director of Sales, British Gas Corporation

OIL
P.B. Baxendell, CBE,
Chairman, Shell Transport & Trading Ltd.

COAL
Sir Derek Ezra, MBE
Chairman, National Coal Board

TUESDAY, SEPTEMBER 23 — 1415
ELECTRICITY
G.A.W. Blackman, CBE
*Board Member, Central Electricity Generating
Board*
NUCLEAR
Dr. Lewis Roberts,
*Director of Harwell, United Kingdom Atomic
Energy Authority*

SESSION FOUR
WEDNESDAY, SEPTEMBER 24 — 1430
POLLUTION FROM ROAD VEHICLES—
Introduction and Discussion of Society's new
booklet.

"POLLUTION FROM ROAD VEHICLES"
J.H. Boddy, Dr S.R. Craxford and
Dr A.W.C. Keddie

SESSION FIVE
THURSDAY, SEPTEMBER 25 — 0930
SMOKE CONTROL—
A SURVEY OF THE PRESENT POSITION
R.E. Dudding,
Department of the Environment
**THE NEED TO COMPLETE SMOKE CONTROL
PROGRAMMES**
Frank Haynes, MP

SESSION SIX
THURSDAY, SEPTEMBER 25 — 1430
OPEN SESSION—
Panel of Experts
R.E. Dudding
Department of the Environment
Frank Haynes
Member of Parliament
L.E. Robson
City of Bristol
M. Tunnicliffe
HM Alkali and Clean Air Inspectorate

SESSION THREE
WEDNESDAY, SEPTEMBER 24 — 0930
NOISE
**ENVIRONMENTAL NOISE STANDARDS AND
CRITERIA—**
Professor J.B. Large,
*Institute of Sound and Vibration Research,
Southampton University*
**THE ROLE OF THE LOCAL AUTHORITY IN THE
CONTROL OF NOISE**
G. Charnley
*Environmental Health Officer, City of
Southampton*

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SIR JOHN GREENBOROUGH TO GIVE KEYNOTE ADDRESS AT 1980 CLEAN AIR CONFERENCE

Sir John Greenborough, KBE, Vice Chairman of Shell UK and President of the Confederation of British Industry, will deliver the Keynote Address at the 1980 Clean Air Conference (Bournemouth, September 22 - 25). Sir John Greenborough, who is a past President of the National Society for Clean Air, will take as his theme Energy and the Future, with particular reference to the conservation of energy and the environment. The Keynote Address will be given before Conference on Monday September 22nd, at 8.30 pm, and will set the scene for the discussion of Energy and the Future Environment at the Conference on Tuesday September 23rd.

Sir John will be in the Chair during Tuesday's all-day 'Energy' session, when leading representatives of the energy industries in the UK will give their views on the future of energy supplies, the need for energy conservation, and the implications for the environment. Gerald Foley, of the International Institute for Environment and Development, will open the general discussion on the presented papers.

On Wednesday September 24th, the subjects for discussion are Noise (morning), and Pollution from Road Vehicles (afternoon). The morning of Tuesday, September 25 will be devoted to Smoke Control, and in the afternoon there will be an Open Session, when questions on air pollution subjects will be fielded by a panel of Experts.

NEW SECRETARY FOR ROYAL SOCIETY OF HEALTH

The Royal Society of Health has appointed J. Audrey Ellison, B.Sc.(Hons.), F.I.F.S.T., F.R.S.H., as Secretary of the Society. It is the first time that a woman has held the post in the Society's 104 year history. Ms. Ellison, who was educated at the Universities of London and Oslo, also undertook postgraduate studies in biochemistry and microbiology at University College London and Chelsea College.

Having worked as a food microbiologist specialising in cereals, Ms. Ellison joined the teaching staff of the Department of Household Science, Queen Elizabeth College, London. From 1961-72 she acted as food consultant to a number of leading food manufacturers in the U.K. and in Scandinavia. In 1972 she was appointed Head of the Department of Nutrition and Home Economics at The Flour Advisory Bureau.

Ms. Ellison is the author of many books and articles on culinary matters, and she also devotes time to her interest in the search for new useful plants and the utilisation of herbs. One of her other main interests is music and she serves on the Appeals Committee of the English National Opera.

By calling upon the expertise of its multidisciplinary membership, Ms. Ellison plans to extend the role played by the Society in health education, placing particular emphasis on the relationship between present day lifestyle and disease. Ms. Ellison has been in post since January 1980.

NEW SMOKE CONTROL ORDERS

The lists below are supplementary to the information in the issue of **Clean Air (Vol. 10, No. 1)** which gave the position up to **30th September 1979**. They now show changes and additions up to **31st December 1979**.

Some of the areas listed are new housing estates, or areas to be developed for housing. The total number of premises involved will therefore increase.

The list of new areas in operation of smoke control is based on the plans submitted to the Department of Environment, but may erroneously include some local authorities who have made postponements, without notifying the Ministry of the fact.

ENGLAND

NEW SMOKE CONTROL ORDERS IN OPERATION

Northern

Gateshead No. 8, No. 9, No. 10 (Dunston), No. 11 (Deckham), No. 12 (Carrhill) and No. 13 (Bensham); Langbaugh No. 5 (South Bank, South); Preston No. 39 and No. 40; South Tyneside No. 3 and No. 4; Stockton-on-Tees No. 16 (Oxbridge) and No. 17 (Grangefield).

North West

Ellesmere Port and Neston No. 16; Hyndburn No. 39; Oldham No. 32 (Salts Street, Crompton); Stockport No. 20 (South Reddish/Heaton Norris); Wigan (Orrell No. 1).

Yorkshire & Humberside

Barnsley No. 21 (Barugh), No. 22 (Mapplewell), No. 23 (Staincross), No. 24 (Staincross); Calderdale No. 3 (Ripponden — Ripponden/Rishworth); Harrogate No. 10 (Bilton); Kirklees (Colne Valley No. 3); Oldham No. 32 (Salts Street, Crompton); Rotherham (Brecks); Sheffield No. 30 (Ecclesfield); Wakefield (Calder Grove No. 1); York, City of, No. 7.

West Midlands

Coventry No. 22; North Warwickshire No. 5; Rugby No. 23; Wrekin No. 4.

East Midlands

Bassetlaw (Worksop Area No. 6A) (NCB Manton); Blaby No. 12 (Glenfield South); Broxtowe (Eastwood No. 3); Erewash No. 5 (Rutland, Ilkeston); Gedling No. 7; Lincoln No. 17; Rushcliffe No. 2; South Kesteven No. 10 (Grantham No. 26).

South West

Bristol No. 15.

South East

Brighton No. 4; Broxbourne No. 9 and No. 10; Gillingham No. 10; Luton No. 15; Milton Keynes No. 5; North Bedfordshire No. 10; Oxford City No. 18; Thurrock No. 15; Watford No. 18 (Kingswood) and No. 19 (Woodside).

London Boroughs

Barnet No. 17; Havering No. 10; Newham No. 15.

NEW SMOKE CONTROL ORDERS CONFIRMED BUT NOT YET IN OPERATION

Northern

Darlington No. 18 (Bank Top); Langbaugh No. 1 (Redcar Central); South Tyneside No. 5 and No. 6; Sunderland No. 18.

North West

Hyndburn No. 40; Liverpool No. 31, No. 32 and No. 33; Manchester (Beswick) and (Woodlands Road Extension); Oldham No. 33 (Freehold) and No. 34 (Oak Street/Shawside); South Ribble No. 9 and No. 10; St. Helens No. 22; Wirral (Area No. 1 Mersey) and (Area No. 2 Tranmere).

Yorkshire & Humberside

Barnsley No. 26 (Barnsley), No. 27 (Royston) and No. 28 (Mapplewell); Calderdale No. 24 (Shelf-Shelf Moor); Kirklees (Batley No. 18); Wakefield (Durkar & Crigglestone No. 1), (Normanton No. 4) and (Pontefract No. 11).

West Midlands

Birmingham No. 169, No. 172, No. 173, No. 174 and No. 534; Lichfield No. 3; Tamworth No. 7A; Walsall No. 28 (Dudley Fields); Warwick No. 16 and No. 17; Wyre Forest No. 3.

East Midlands

Ashfield No. 9 and No. 10; Mansfield No. 6.

East Anglia

Peterborough No. 8 and No. 9.

South East

Bracknell No. 8 (Sandhurst/Little Sandhurst); Dartford No. 18 and No. 19.

London Boroughs

Hillingdon No. 34, No. 36 and No. 37.

**NEW SMOKE CONTROL ORDERS
SUBMITTED BUT NOT YET
CONFIRMED**

Northern

Darlington No. 18 (Bank Top); Stockton-on-Tees No. 18 and No. 19.

North West

Ellesmere Port and Neston No. 17; Hyndburn No. 40; Oldham No. 34 (Oak Street/Shawside); Pendle (Earby/Foulbridge); Stockport No. 21 (Bredbury/Woodley); Tameside (Longdendale No. 2).

Yorkshire & Humberside

Barnsley No. 29 (Darton), No. 30 (Darton), No. 31 (Barugh) and No. 32 (Darton); Scunthorpe No. 13.

West Midlands

Birmingham No. 169, No. 172, No. 173, No. 174 and No. 534; North Warwickshire No. 6; Nuneaton No. 19 (Bedworth Central); Tamworth No. 7A; Wyre Forest No. 4.

East Midlands

Blaby No. 3; Broxtowe No. 4 (Kimberley).

South East

Milton Keynes No. 6.

London Boroughs

Hillingdon No. 38.

SCOTLAND

**NEW SMOKE CONTROL ORDER IN
OPERATION**

Dundee District (Wester Clepington).

**NEW SMOKE CONTROL ORDER
CONFIRMED BUT NOT YET IN
OPERATION**

Dundee District (North Central).

**NEW SMOKE CONTROL ORDERS
SUBMITTED BUT NOT YET
CONFIRMED**

Edinburgh District (Comeley Bank); Hamilton District No. 9.

CORRECTION

The reference to the recently confirmed Kirklees Smoke Control Order in *Clean Air*, Vol. 10, No. 1, p.23. should have read "Kirklees (Huddersfield) No 19 (Berry Brow)" and not No 14 as printed.

SMOKE CONTROL AREAS

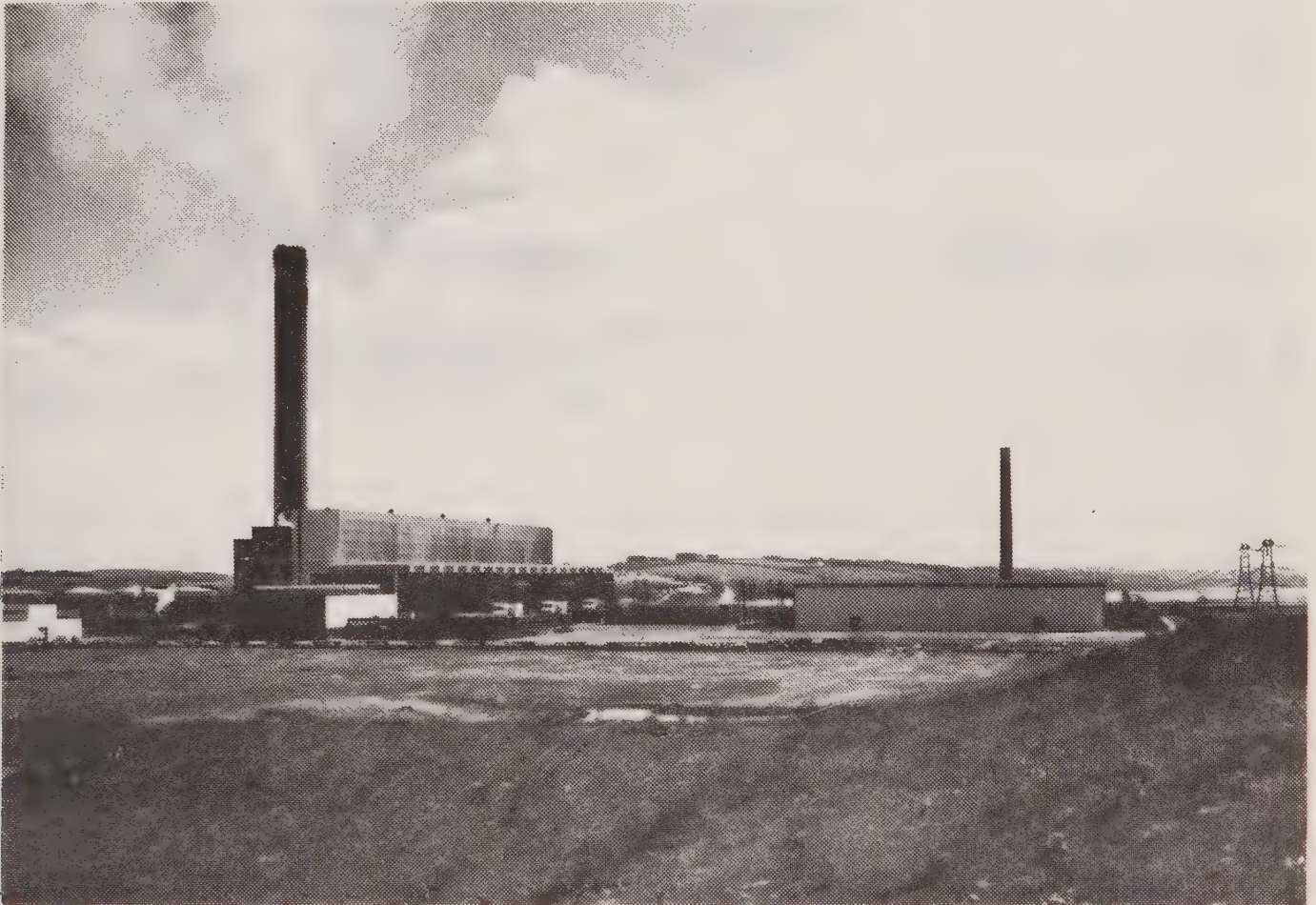
Progress Report
Position at 31st December 1979

(Figures supplied by the Department of the Environment, the Welsh Office, the Department of the Environment for Northern Ireland and the Scottish Development Department).

	England		Wales		Scotland		Northern Ireland	
Smoke Control Areas Confirmed to 30.9.79	5,087	1,774,086	34	3,331	279	156,109	81	19,421
Acres		7,436,883				635,068		58,588
Premises								
Smoke Control Areas Confirmed (1.10.79 - 31.12.79)	48	20,188	—	—	1	178	—	—
Acres		64,583				2,932		—
Premises								
Totals	5,135	1,794,274	34	3,331	280	156,287	81	19,421
		7,501,466				638,000		58,588
Smoke Control Areas Submitted (1.10.79 - 31.12.79)	27	15,684	—	—	2	2,429	—	—
Acres		37,911				3,884		—
Premises								
Grand Totals	5,162	1,809,958	34	3,331	282	158,716	81	19,421
		7,539,377				641,884		58,588
Smokeless Zones (Local Acts) in Operation	44	3,400	—	—	—	—	—	—
Acres		41,060				—		—
Premises								



Caring for the environment



The Central Electricity Generating Board has received more than 40 Commendations and Awards for environmental schemes at power stations, substations and associated nature trails and field study centres in England and Wales.

They include the Arnold Marsh Clean Air Award, two Prince of Wales Awards, four from the Business and Industry Panel for the Environment, six RICS/Times Conservation Awards and nine Wales in Bloom Awards.

Central Electricity Generating Board

BOOK REVIEWS

Chemical Carcinogenesis, British Medical Bulletin, Vol 36, No. 1, January 1980. Published by The British Council, 65 Davies Street, London W1Y 2AA. 104 pages. £6.00 (single number).

The present number of the British Medical Bulletin is the fourth to be devoted to cancer, and contains fifteen papers, together with an introduction by Dr. P. Brookes, Scientific Editor of the number. Dr. Brookes suggests that the major distinction between the present issue and its predecessors is the emphasis on the mechanisms of action of chemical carcinogens as a whole rather than consideration of each class of compound; although the chemical structure of carcinogens varies greatly, the ultimate reactive species have many common features, and the vital cellular receptor is probably the same in many instances.

Professor E. Boyland, reviewing "The history and future of chemical carcinogenesis", points out that most cancer is caused by external factors, although the exact proportion cannot be defined. "Environmental" factors include both intrinsic and extrinsic factors — as there must be a host as well as carcinogenic features for cancer to occur. Many occupational cancers are known, and the factors involved are more readily investigated by epidemiological methods than are most other aspects of the environment. Opinions as to what proportion of cancers are industry-related vary widely but Professor Boyland's conclusion is that "having regard for the continued growth of industrialisation and the long latent periods in cancer, an increase must be expected. The chemicals made or used in industry may sometimes contribute to cancer in persons living near the factories or mines though not working in the industry. Such people might be said to have "industrial" cancer but not "occupational" cancer." Stressing the importance of prevention, Professor Boyland writes:

"....cancer incidence will decrease with a decrease in the abuse, misuse and overuse of chemicals that result in man-made pollution, with a decrease in the practice of hazardous personal habits (tobacco smoking, sunbathing) and with a decrease in both occupational and non-occupational exposure to chemicals".

J. Ashby and J.A. Styles conclude their paper "Carcinogenic synergism and its reflection in vitro" by suggesting that a practical solution to the problem of human exposure to carcinogens, might be

"to accept the concept that for any agent there is an exposure level for which there is an acceptable risk to the human population as a whole, together with the caveat that the occurrence of different individual practical thresholds within a population will mean that the boundaries of this dose level will be somewhat diffuse".

J.C. Wagner, G. Berry and F.D. Pooley, in their paper "Carcinogenesis and Mineral Fibres" have enlarged the study to include other mineral fibres, man-made and naturally occurring, as well as asbestos fibres. The types and uses of asbestos and man-made mineral fibres are considered and epidemiological investigations and animal studies into the relationship between asbestos and cancer are reviewed. Less research has been conducted into the effects of man-made mineral fibres on health. Indeed, the commercial production of small diameter fibres has only been introduced to any extent in the last decade or so. Following studies of an outbreak of pleural mesothelioma in a small Turkish village, it has

also been realised that naturally occurring mineral fibres, of certain size characteristics, are possibly carcinogenic.

Digest of Environmental Pollution Statistics No. 2 1979. Department of the Environment. A publication of the Government Statistical Service, HMSO, £5.25, 116p.

The second edition of this excellent publication is very welcome; even though the price has risen considerably, it is still value for money. The Digest provides statistics on air pollution, freshwater pollution, marine pollution, noise and wastes. Perhaps most valuable of all are the tables showing trends: in emissions, concentrations, and abatement. This edition updates and extends the information contained in the 1978 Digest (which was reviewed in *Clean Air*, Vol. 9, No. 1, page 4). The tables and figures which present the information have been abstracted from many different reports and papers, some of which would not be read in the normal way by those interested generally in pollution control progress in the UK. The figures (numbers) do not always relate to the most recent years but were the latest available in July 1979. As might be expected, Warren Spring Laboratory have made a major contribution to the section dealing with air pollution and the tables cover smoke and sulphur dioxide emissions and concentrations, particulates' emissions, pollution from road vehicles, and nitrogen oxides, carbon monoxide and hydrocarbons emissions (by source).

The percentage contribution made by road vehicles to total emissions of nitrogen oxides, carbon monoxide and hydrocarbons is increasing and as clean air policies have been applied to reduce emissions of smoke from domestic and industrial premises, the percentage contribution of smoke from road vehicles, particularly diesel engines, has also risen (and particulates from the combustion of diesel fuel have about three times the soiling capacity of coal smoke). Overall, according to the Digest, air pollution from road vehicles has risen by about 40% in the last ten years.

The section on noise (exposure and abatement) contains six new tables/figures — six from the previous Digest were not repeated in this edition; a similar policy is followed in all sections, so that those interested in obtaining as wide a range of information as possible would do well to obtain each Digest as it appears.

Among the supplementary figures and tables is one on public opinion, updating previously published information. The question asked in the survey, conducted by Opinion Research Centre, was "One of the problems concerning many people today is pollution of the environment. What types of pollution — if any — do you personally feel concerned about?" In 1976, 39% of all respondents put air pollution at the top of the list; in 1978, the figure had risen to 45%. Exhausts from lorries and buses tops the list of air pollution problems mentioned by respondents, factories and industrial plants and exhausts from cars being the other two most commonly mentioned causes for concern. Concern about noise has stayed steady, with 11% of respondents putting it first in 1976 and 1978. However, complaints about noise are on the increase, especially about noise from commercial and domestic premises. Fewer respondents were unconcerned about pollution in 1978: 11% compared with 18% in 1976.

Traffic Noise: A Review and Bibliography on Surface Transportation Noise 1964-1978. *Vulkan, G. and Gomersall, A., Greater London Council. I.F.S. (Publications) Ltd., Jan. 1979. £18 plus £1.30 p. & p.* Available from I.F.S. (Publications) Ltd., 39 High Street, Kempston, Bedford, MK42 7BT, England.

Studies related to noise have proliferated in the last 20 years and anyone investigating published literature faces a daunting task. The scope of this review and bibliography is restricted to surface transportation noise (road traffic and railways); in the opinion of the authors this is the aspect of noise which affects the greatest number of people.

The bibliography is not intended to be comprehensive: the authors believe that they have included the significant contributions from research workers, highway engineers and legislative bodies, made between 1963 and 1978. The proceedings of relevant major conferences have also been examined and limited selections have been made from the very large number of papers available. A similar approach has been made to major periodicals in the acoustics and noise subject fields. References have been restricted to those publications readily available from such bodies as the British Library and NTIS in the United States. The bibliography is broken down into 12 main subject sections, with subsections for easy reference. There is an author index and a guide to other sources of bibliographic references on surface transportation noise.

The review 'Noise from road and rail traffic' by George Vulkan which prefaces the bibliography is wide-ranging but admirably concise: an excellent state-of-the-art summary.

This is an essential publication for technical and reference libraries and should prove of great value to research workers, engineers, and all those concerned with noise control.

The Physical Environment. *B.K. Ridley. Ellis Horwood series in Environmental Science, Chichester, 1979.* Distributed by John Wiley & Sons. 236 pages. £8.50.

Man's technical knowledge and increased manipulation of potentially destructive forces is matched by a general lack of understanding of the way in which the delicate balance of the subtle interrelationships working within Nature may be upset by such interference. This has prompted the author to produce a book explaining the basic fabric and structure of the environment. Aimed at students of science and engineering, it is a wonderfully informative publication, very well presented with diagrams, maps and beautiful photographs. It contains a short section on pollution in the chapter dealing with the atmosphere. The book brings together work undertaken in many fields and the author's simplified and coherent approach has made for a unified study of the physical environment which doubtless will be enjoyed by many readers.

Applied Solar Energy. *D. Kut and G. Hare. The Architectural Press Limited, 1979, 149 pages, £7.95*

As concern and interest into alternative energy sources grow, so too does the volume of literature on solar energy systems. "Applied Solar Energy" is designed to provide

a practical approach to the installation and maintenance of solar heating systems for the professional engineer and associated building expert. It also boasts to cater for the more sophisticated DIY enthusiast.

Although some reference is made to the various uses of solar energy currently undergoing research such as pebble beds and drying systems, it concentrates on the practical aspects of selecting, installing and maintaining a variety of systems for hot water supply, swimming pool and space heating, and deals in particular with the design and maintenance of solar collectors. There is a chapter devoted to legislation/codes of practice and one to metric and imperial units of measurement.

This is a useful manual for the professional wishing to familiarise himself with new and improved solar systems currently available on the market.

Law of Industrial Pollution Control. *Andrew Walker. pub. George Unwin Ltd., 1979. 194 pages. £10*

Failure by industrialists to comply with current pollution control legislation could result in heavy penalties. Accordingly, this book is intended as a working manual for those in industry, such as plant managers and engineers involved in commissioning and operating an industrial concern, who have no specialist legal training but need to know what their legal obligations are.

It gives a summary of the law in respect of the pollution control legislation affecting industry to date and attempts to give guidance in the areas where recent legislation is still open to interpretation. Local authority officers directly concerned with administering the law or consulting and advising a new enterprise of the legal operating standards would also find this a useful reference work.

CLIMATIC CHANGE – THINK TANK REPORT

A report* has been issued by the Interdepartmental Group set up to examine the social and economic implications of long-term changes in climate. Increasing carbon dioxide levels (from fossil fuel burning and deforestation) might lead to a warming of the surface and lower atmosphere. Some climatologists, however, have speculated that the climate may become colder in the next 30 years or so. Therefore, the Climatology Group, chaired by Sir Kenneth Berrill, Head of the Central Policy Review Staff, asked civil Departments to consider the effects of changes in the annual and seasonal average temperature of about 1·2°C in either direction and a change of about 10% in annual or seasonal rainfall.

MAFF, the Department of Energy, DOE/DOT and DOI/Dept. of Trade responded briefly and conservatively; warmer winters would mean £300m a year less spent on fuel for heating (1977 prices), colder or wetter winters could lead to heavy costs due to transport difficulties and construction industry delays; a significant rise in global temperature would in the long term lead to a rise in sea levels which would necessitate raised sea defences or the abandonment of land to sea.

The Department of the Environment notes that weather affects the dispersion, dilution and impact of pollutants; any frequency of inversion conditions would be likely to raise concentrations of atmospheric pollutants, especially of sulphur oxides, in urban air. "If summers became significantly sunnier, with less wind, photochemical smog problems would be likely to increase. Both kinds of change might need to be offset by tighter emission controls."

Currently, about £1m a year is being spent directly on climatic research in the UK, and an additional £17m of annual research expenditure by Government Departments and Research Councils include some examination of the effects of weather. The details of research in progress are set out in the report.

The conclusions and recommendations of the Climatology Group are that the present research plans (UK and international) are adequate, with no gaps in research coverage, but that the Group itself should remain in existence to provide an annual review of climatology studies. On the whole, the UK, already subject to variable and less predictable weather than most other parts of the world, should be able to cope with changes foreseen in the report, but there would be some significant expenditure involved, especially if sea defences had to be strengthened.

*Climatic Change. Its potential effects on the United Kingdom and the implications for research. Cabinet Office, January 1980, HMSO, £1.75p. 19 pages.

REDUCING BYSSINOSIS RISK

A Major Task facing the Cotton Industry

The control of cotton dust still remains one of the most difficult problems facing an industry which has achieved many significant milestones in its health and safety history, says a report published by the Health and Safety Executive.

The report gives an historical review of developments in the understanding of dust-related disease in the cotton industry and also describes developments relating to the safeguarding of machinery and the problem of noise.

The report refers to an article by Dr Leach, a certifying factory surgeon of Heywood, near Manchester, published in the *Lancet* in 1863. The writer described the hazards to the health of operatives in the cotton mills, and pointed out in particular that cardroom operatives seldom lived beyond the age of 40. This article is one of the early records of the suspected association between dust in the atmosphere in a cotton mill and the disease that is now known as byssinosis (a chronic lung condition). About the time that Dr Leach was working as a certifying factory surgeon, American cotton was being replaced by shorter staple and "dirtier" East Indian or Surat cotton. It was often difficult to recognise a man at a distance of 12 yards in a cotton mill because of the density of floating fibres in the atmosphere.

Over the years, studies of the problem produced an accumulation of evidence which suggested that the health hazard was most closely associated with cardroom processes and, in particular, that of stripping the card, when dirt and loose fibres were removed from the card cylinder and doffer. Various attempts were made to solve the problem and concern

was expressed throughout the first half of the century about the health risk experienced by cotton operatives. But when, in 1946, the Chief Inspector of Factories referred the problem to the Joint Standing Committee for the cotton industry, the Committee reported that it had not been able to find any mill in which the dust at carding machines was effectively controlled. It went on to recommend that research into the problem should be undertaken. Five years later the British Cotton Industry Research Association developed a method of local exhaust ventilation and by 1960, most carding machines were equipped with some local exhaust ventilation, which resulted in noticeable improvements in atmospheric conditions.

Thus, major technological advances transformed the industry but byssinosis continued to be diagnosed among some workers. In 1977, some 87 new cases of byssinosis were accepted for industrial benefit and at present about 3000 people are receiving benefit, at a rate of about £2.25m a year. The report concludes that everybody in the industry must tackle the dust problem energetically and in a systematic way.

This report is the first published by the Factory Inspectorate's Cotton National Industry Group (NIG) which was set up in 1977 and based in Greater Manchester. The report, entitled "Cotton and Allied Fibres: Health and Safety 1971-77", is available from HMSO, price £1 plus postage (ISBN 0 11 883291 3).

WORLD CONSERVATION STRATEGY

The World Conservation Strategy was launched on March 5th 1980 in London and some 30 other world capitals. The Strategy is an attempt to provide an intellectual framework and practical guidance for action to conserve nature and natural resources. It has been prepared by the International Union for Conservation of Nature and Natural Resources (IUCN) with the advice, co-operation and financial assistance of UNEP and the World Wildlife Fund.

IUCN have prepared for the Strategy with a pack of information and guidance. One fifth of this document deals with global environmental problems and the other four fifths is devoted to what should be done. The message is that development depends upon conservation and that conservation depends equally upon careful development. The Strategy aims to advance the achievement of sustainable development through the conservation of living resources. It tries to overcome the belief that conservation of living resources is a specialised activity rather than a process that cuts across and must be considered by all sectors of activity. It throws the blame for the lack of capacity to conserve on poor organisation, lack of trained personnel and lack of basic information. The Strategy proposes that every country (or governing unit such as a province or a state) should prepare a conservation strategy. Some countries have already begun to act: Thailand and India included conservation strategies in their five-year plans; the Soviet Union and New Zealand are developing national conservation strategies. The document establishes priorities for national action and points out that many aspects can only be tackled internationally.

Much destruction and over-exploitation of living resources in the developing countries is a response to relative poverty, caused or exacerbated by a combination of rising human numbers and inequities within and among nations. In many parts of the world, population pressures are making demands on resources beyond the capacity of those resources to

sustain themselves. The Strategy advocates the use of national population policies.

The three principal objectives of conservation are determined as follows:

- maintenance of essential ecological processes and life support systems;
- preservation of genetic diversity;
- sustainable utilisation of species and ecosystems.

The World Conservation Strategy documents are available in a pack which can be purchased from the World Wildlife Fund, price £3. The Strategy is also published as a book, entitled "How to Save the World, Strategy for World Conservation" by Robert Allen, Senior Policy Adviser to IUCN, who compiled and edited the Strategy itself. This book is published by Kogan Page Limited, London, and costs £2.95p (paperback) or £5.95 (hardback). The book will be particularly useful as an educational teaching aid and source of reference.

DIVISIONAL NEWS

SOUTH & MID WALES DIVISION

On 12th October 1979 the Division held a meeting at the Aberthaw and Bristol Channel Portland Cement Co. Ltd., Barry. The meeting was addressed by Sir Michael Jenner, Chairman of the Company, who gave an introductory talk on the operation of the works. This was followed by a technical talk and discussion given by Mr R. Ellwood (Works Manager) followed by Mr R. Perriman (District Alkali Inspector). All speakers dwelt for some considerable time on the problems that arise from the operation of a cement works. The talks were followed by a conducted tour of the process and finally tea was provided by the courtesy of the Company.

On 31st January 1980 a meeting was held at B.P. Oil Company, Llandarcy, when Mr W.L. Lowden (Head of the Environmental Department at Llandarcy) gave an introductory talk on the processess undertaken at the works. Mr Lowden described the processess and problems of an oil refinery and this was followed by Mr R.J. Perriman (District Alkali Inspector) who outlined the Alkali Inspector's involvement with such complicated processess. The talks were followed by a conducted coach tour of the works in order that members could be acquainted with the practical problems of such a works. Finally over tea, which was provided by the Company, Mr. Lowden answered all questions put to him by members in attendance.

For the future it is planned that the Annual General Meeting of this Division will take place on 6th June 1980, at the Guildhall, Swansea. At this meeting Professor P.J. Lawther and Rear Admiral P.G. Sharp will be giving talks on "Pollution From Road Vehicles" and "The Role of the Society in The Future".

It is also hoped that on the 5th September 1980 another meeting of the Division will take place, at the South Glamorgan Institute, and will take the form of a Seminar when three guest speakers will be presenting papers on the theme "Clean Air for The 1980's".

*T. Jones,
Hon. Secretary*

INDUSTRIAL NEWS

Curatorcarb — Filtration System for Museum and Exhibition Showcases.

Machine Control Limited of Horsham, Sussex, specialists in industrial filtration, have introduced a new method of maintaining a clean and inert environment within showcases holding valuable or fragile exhibits. Entitled 'Curatorcarb', the system removes dust and particles down to 0.6 micron (0.0006mm) to 99.998% efficiency, and at the same time eliminates the principal contaminant gases associated with air pollution — sulphur dioxide, hydrogen sulphide, nitrogen dioxide and ozone. It is small, easily fitted to a single showcase or a series and its maintenance is covered by an exchange unit service operated by Machine Control.

Curatorcarb is a development of Machine Control's Sonoxcarb filter, and uses the same high-quality activated carbon granules. It consists of two units: the main filter unit, a circular drum, measuring 308mm diameter by 230mm in height, which is fitted to one side of the showcase, and a separate, smaller breather unit, fitted to the opposite side.

The filters fitted to the main Curatorcarb unit are designed to give a two stage performance. The activated carbon granules are of a type unique to Machine Control; in addition to a high adsorption capacity across the range of atmospheric pollutant gases, a further chemical impregnation process gives the carbon the chemisorption properties needed to remove both hydrogen sulphide and sulphur dioxide to a high efficiency.

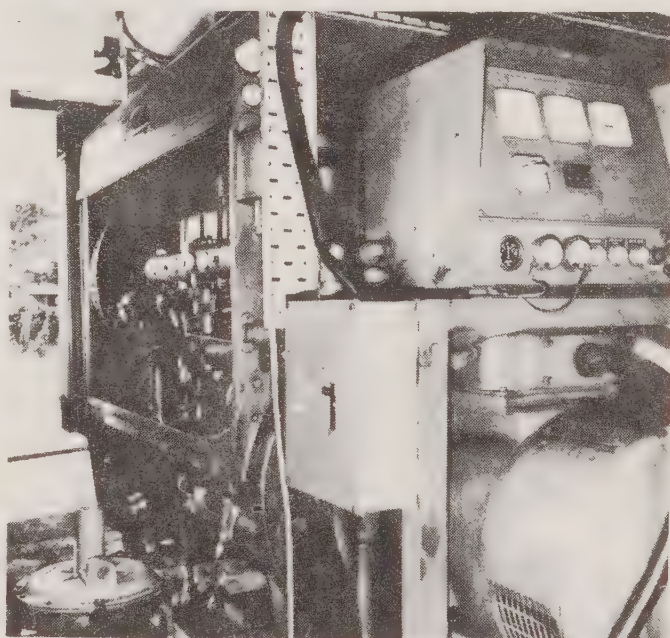
Although normally fitted to a single showcase, Curatorcarb can also be used for a number of showcases connected in series, and will be equally efficient so long as the correct pressurization can be maintained. Also, by means of a linking hose, the main unit can be located remotely if desired. Reader Enquiry Service No. 8018

Methane-Powered Gas Engine

The first spark-ignition gas engine to use, as its only fuel, methane drained from a mine, has worked successfully since it was commissioned in June 1978 at Cortonwood Colliery, near Barnsley, Yorks.

The Waukesha F817 CU four-stroke, six-cylinder, 115 brake horsepower (86 kilowatt) continuously rated gas engine, turns at 1,000 rpm. It is direct coupled to a 70 KVA alternator and burns 16 litres/second of mine methane at about 50% purity.

The generator supplies the electricity needed for lighting and power in the pit-head baths, and like all gas engines, is environmentally clean.



This plant comes from an assessment of spark-ignition gas engines that began in 1977 aiming at reliability, low waste-heat ratio, low running costs, and comparative simplicity.

One of the special interests of this installation is that, being the first small unit to rely entirely on this mine-produced waste gas, it enables colliery managers to use relatively small flows. It could therefore be welcomed at mines with a small total or small excess flow of drained methane (in addition to that committed to other uses

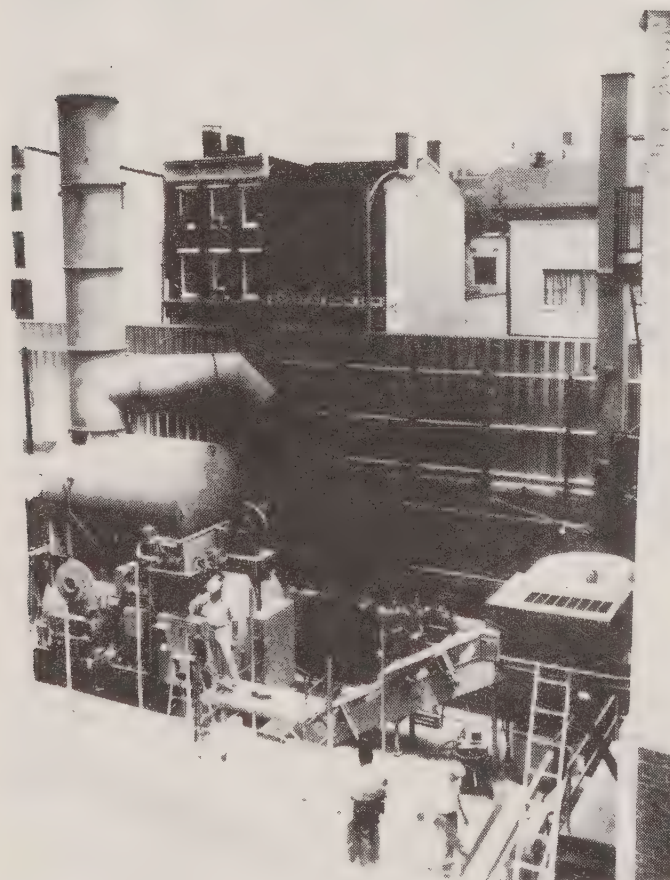
such as firing boilers or larger gas engines), giving a chance of worthwhile money savings and generous returns on investment.

Larger gas engines of some 0.5 megawatt net output could naturally make larger savings. Preliminary studies suggest that provided the utilisation of both waste heat and generated electricity is high, a payback period of about four years is possible. Reader Enquiry Service No. 8019

New Incinerator/Heat Recovery Range

As part of their waste handling activities, Lindemann (UK) Limited are introducing a range of incinerators which provide clean air and reduce heat bills.

The ECP incinerators have been proven in America over many years and in practice have met every local and national emission codes world-wide, and have repaid the purchase price in 1½ years by utilising the highly developed heat recovery system.



The units work on a basis of controlled air burning through two chambers ensuring that practically no smoke or dust is emitted. All waste material of whatever nature is

reduced to ash and feeding is highly controlled to suit customer requirements. Minimal cleaning out is needed.

The heat recovery system which can be fitted to any unit will produce a pre-specified energy output and the amount of firing fuel will also be precise.

Operation is extremely simple and mixed products can be handled with a maximum throughput of 4000 lb per hour. Each plant is designed to match the refuse requirement and to maximise energy savings regardless of the products to be incinerated.

The unit has been proven in a wide variety of applications including power plants, hospitals, chemical factories, plus timber, paper, rubber, plastic and fibre installations.

Lindemann have been appointed by Environmental Control Products Inc., (ECP) of Charlotte, North Carolina to represent them throughout the whole of the UK and Ireland.

Reader Enquiry Service No. 8020

Engelhard Opens New Factory in Wales

Engelhard Industries, the international precious metals organisation, has opened a new factory in Wales.

It is at Caldicot, near the Severn Bridge and M4 motorway, and houses the Engineering Division which manufactures electro-chlorinators, process gas purifiers and pollution control equipment.

The Engineering Division was formerly located at the company's chemical plant at Cinderford, Gloucestershire.

Increased demand for the division's products has necessitated the move to Caldicot where there is more room to expand production facilities.

Senior executive at the new site is Mr B.D. King, General Manager of the Engineering Division.

The address is: Engelhard Industries Limited, Engineering Division, Norman Way, Severnbridge Industrial Estate, Portskewett, Newport, Gwent NP6 4YN. Telephone: Caldicot (0291) 423833.

Reader Enquiry Service No. 8021

Rolls-Royce Commercial LPG Engines — UK Distributor Appointed

Rolls-Royce Motors Limited have appointed the newly established firm of LPG Truck Power (subject to registrar's approval) of Bury St Edmunds as UK Distributors for their range of commercial vehicle gas engines. This appointment is an indication of Rolls-Royce Motors confidence in the market potential for liquid petroleum gas engines in this country.

Rolls-Royce Motors are expecting a considerable increase in the use of commercial vehicle LPG engines in the 120 to 200 hp range, either as original or replacement units. Mr Lionel Gibbs, Marketing Manager of Rolls-Royce Motors Specialist Engines Division explained, "Recent changes in the availability and price of liquid petroleum gas, relative to other fuels now make it a far more attractive and viable proposition than it has been in the past. Advantages of this type of engine include better acceleration, lower operating noise levels, the almost complete elimination of unburnt hydro-carbons from the exhaust emissions and a reduction in emissions of oxides of nitrogen. Applications where LPG engines will provide a major benefit include stop/start vehicles operating in heavily populated areas where the 'clean-air' aspect of their performance is at a premium. Refuse collection vehicles, milk tankers, buses and local delivery vehicles have been fitted with Rolls-Royce LPG engines and are operating successfully in the UK."

Reader Enquiry Service No. 8022

Chemical Hazards — New Guide

The United States Department of Health, Education and Welfare in association with the Department of Labor, has published a Pocket Guide to CHEMICAL HAZARDS — presenting data in a tabular, pocket-size format for ease and convenient use as a quick reference source of information relating to industrial hygiene and medical surveillance practices.

Prepared by the National Institute for Occupational Safety and Health (NIOSH) and the Occupational Safety and Health Administration (OSHA), the Guide contains information on chemical names and synonyms, permissible exposure limits, chemical and physical properties, signs and symptoms of overexposure, environmental and medical monitoring procedures, respiratory and personal protective equipment use recommendations, and procedures for emergency treatment.

Reader Enquiry Service No. 8024

Fuel Efficiency Monitor Launched

High energy costs are sowing the seeds of inventiveness in the UK, Mr John Moore, Minister with responsibility for energy conservation at the Department of Energy said at the launch of a new piece of energy saving equipment.

"It is highly encouraging to know that we are meeting the challenge of increasingly expensive fuel with a positive approach. Already British industry has built up an impressive body of knowledge and expertise in energy management appointing some 5,000 energy managers over the last few years", said Mr Moore.

"We are now seeing an equally positive response as high energy prices sow the seeds of inventiveness in the UK. Traditional engineering skills are being blended with new technology resulting not only in benefits to energy users but also in terms of industrial investment, jobs and potential exports".

Mr Moore was speaking at the launch of a new fuel efficiency monitor which has been developed by Neotronics Ltd with the support of the National Research Development Corporation.

The monitor is designed to measure combustion efficiency of boilers and furnaces. It is estimated that inefficient boilers and furnaces waste energy worth hundreds of million of pounds a year in the UK alone.

Reader Enquiry Service No. 8025



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NSCA PUBLICATIONS LIST 1980

The National Society for Clean Air have produced a comprehensive list of their recent publications, including a full guide to conference and seminar papers published since 1972. The catalogue is expected to be of value to professional bodies, institutions, universities and libraries generally. A copy of the catalogue may be obtained, free of charge, on application to the National Society for Clean Air, 136 North Street, Brighton BN1 1RG. Tel: Brighton (0273) 26313.

EPEMA

The 1979-80 EPEMA Members' Handbook is now available. EPEMA, the Environmental Protection Equipment Manufacturers' Association, is a non-profit making trade association, financially supported entirely by subscriptions from members. Membership is open to manufacturers of equipment designed to reduce and/or monitor pollution emitted to the environment, the installers of such equipment and those who use such equipment to provide service for the measurement, control and abatement of all forms of pollution. Associate membership is open to recognised consultants engaged in the field of pollution control. The Association was formed in 1972, has developed since that time and has now achieved a position of some standing. The Members' Handbook contains the Chairman's report, membership list, details about members, and about environmental protection equipment.

The Handbook is available, free of charge, on request to The Secretary, EPEMA, 136 North Street, Brighton BN1 1RG. Telephone Brighton (0273) 26313.

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CLEAN AIR

VOL. 10 NO. 3





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The Central Electricity Generating Board has received more than 40 Commendations and Awards for environmental schemes at power stations, substations and associated nature trails and field study centres in England and Wales.

They include the Arnold Marsh Clean Air Award, two Prince of Wales Awards, four from the Business and Industry Panel for the Environment, six RICS/Times Conservation Awards and nine Wales in Bloom Awards.

Central Electricity Generating Board

CLEAN AIR

THE JOURNAL OF THE NATIONAL SOCIETY FOR CLEAN AIR

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ROAD TRAFFIC NOISE

The Department of Transport are working on a long-term policy for further reductions in vehicle noise levels for the mid-1980's and beyond. The Consultation Memorandum, issued in April 1980, warned that in spite of regulations already in preparation to limit noise output from vehicles first used after March 1983, a long-term increase in total noise can still be expected unless more drastic action is taken. Based on the recommendations of the 1963 Wilson Committee Report on Noise, DOT say that the long-term goal for all vehicles in the UK is a noise limit of 80 dB(A). This goal was adopted by the EEC in 1977, to include motor cycles as well as all categories of vehicle.

Heavy lorries cause severe problems, particularly when routed through residential and urban areas on roads totally unsuited to their use. Britain is well placed, with the development work undertaken in the Quiet Heavy Vehicle project, to lead the way in international moves towards quieter heavy commercial vehicles. And if 80 dB(A) becomes the accepted international noise limit by 1985, as proposed by the EEC, the British motor manufacturing industry cannot afford to lag behind.

While road traffic is the major source of noise in urban areas, complaints from the public still do not reflect the scale of the nuisance. People are reluctant to complain when they feel that little can be done by the authorities. Many of those exposed to traffic noise put up with a steady background level, but find the intermittent bangs and roars intolerable. Badly maintained vehicles driven on ill-kept roads are a source of considerable annoyance, and some motor cycles and mopeds are particularly irritating. Many vehicles on the road exceed noise limits already stipulated in regulations; although MOT tests and the Heavy Goods Vehicles tests provide some check on noise levels, there are great practical difficulties about the enforcement of regulations.

Reduction of noise, whether at source, through attention to road surface or by re-routing is expensive, but noise from road traffic is now an acute problem which not only affects amenity, but in some areas impairs sleep at home and efficiency at work. The latest long-term proposals for reduction of noise at source are very welcome but in the meantime urgent consideration should be given to re-routing heavy lorries away from residential areas and town/city centres. It is also clear that to go to great lengths and expense to specify noise limits for millions of new vehicles of all types and have virtually no enforcement of regulations governing vehicles on the road will reduce the effectiveness of the whole scheme.

ENVIRONMENTAL IMPACT ASSESSMENT, POLLUTION CONTROL AND PLANNING

by
Christopher Wood

Christopher Wood is Lecturer in Town and Country Planning at the University of Manchester and author of 'Town Planning and Pollution Control'. He has acted as consultant to the EEC on EIA procedures and methods.

INTRODUCTION

The Commission of the European Economic Community appears to be finalising its draft directive on environmental impact assessment (EIA). Once this becomes law it will be binding upon the United Kingdom and will almost certainly involve changes in the way in which some land use planning decisions are made. Many of these decisions, by their very nature, have a definite effect on pollution levels and this paper is concerned with the benefits EIA might bring to land use planning controls over pollution.

The first section briefly outlines the concept of EIA and explains the current European Commission proposals. It then describes attitudes to EIA in the UK (which are generally favourable among those concerned with environmental matters). It is necessary to point out that pollution and its effects are only one aspect of EIA — others would include landscape degradation, ecological impacts, etc. The next section of the paper lists some of the powers and responsibilities of local planning authorities (LPA's) in controlling pollution. This is followed by an exposition of the shortfalls of this system of control, largely based upon case studies of its operation in practice. There is then a discussion of the ways in which the introduction of EIA might improve planning controls over pollution. Finally, a number of conclusions are drawn.

ENVIRONMENTAL IMPACT ASSESSMENT

EIA refers to the assessment of the environmental impacts likely to arise from a major action (ie., legislation, a policy, a plan, a programme or a project) significantly affecting the environment. While there is nothing new about this consideration of environmental impacts, the formalisation of the process stems from the US National Environmental Policy Act 1969 and subsequent legal rulings and practice. This requires the proponents of an action to demonstrate that they have, in fact, carried out an assessment by publishing an environmental impact statement (EIS) describing in detail the environmental impacts (including use of resources) likely to arise from the action. The EIA must be carried out before a decision on the action is reached and must constitute an important factor in it.

In the decade since the introduction of this requirement much has been written about its advantages and disadvantages. Some actions have been aborted and many have been modified as a result of the EIA's carried out. Its advocates point to the systematic

comprehensive consideration of environmental impacts, to better consultation and public participation and to a largely undisputed improvement in the quality of environmental decision-making. Its critics emphasise the costs and delays experienced with the US system, together with the encyclopaedic irrelevance and false quantification demonstrated in many EIS's. There is, however, an almost universal American consensus that they have become a useful adjunct to the decision making process.

Many other countries have been attracted to the EIA system, largely as a response to growing public demands for better environmental assessment of new proposals. Australia, Canada and Japan have already introduced EIA provisions and many European countries are implementing (France, Germany, Ireland) or considering (Netherlands, Belgium, Luxemburg) various EIA procedures, generally greatly modified from the original American model, to meet national circumstances.⁽¹⁾

The Commission of the European Community has issued a number of versions of a draft directive on the EIA of both public and private sector projects (developments) for consultation and is hoping that a finalised directive will be approved this year (1980). It would then be binding on all the Member States but would allow considerable flexibility in implementation, particularly in the nature of the projects to be subjected to EIA, if the proposals in the current version (number 18) are ratified.

The draft directive contains a number of provisions relating specifically to pollution⁽²⁾. The developer of a project subject to EIA is required to submit to the 'competent authority' (probably either a county or district planning authority in England and Wales):

1. a description of the proposed project (including a forecast, by type and quantity, of the expected liquid, solid and gaseous emissions, and of the radiation, noise, vibration and odours resulting from the operation of the development);
2. a description of the environment likely to be significantly affected (including, in particular, water, air, solid, climate, flora and fauna);
3. an assessment of the important affects of the proposed development (including those resulting from the emission of wastes, pollutants and nuisance, as well as the secondary effects linked to the elimination of these);
4. a review of the relationship of the proposed project with existing environmental and land use plans and standards for the area likely to be affected (obviously including air quality and ambient noise standards);
5. a justification for choosing the proposed project from the other alternatives;
6. a non-technical summary of the above items.

The document containing this information is to be made available to the public. The competent authority then assesses the information with particular regard to the effect of the project on water, air climate and soil as well as flora and fauna and their inter-relationships. It then publishes its assessment together with its reasons for accepting the

project (or refusing it) and the conditions which it envisages attaching to the approval.

The European Commission suggest mandatory EIA for the construction and operation of one category of new projects (including oil refineries, steel and cement works and highways). They list a second category of projects (including fossil fuel fired power stations, paint works, sewage treatment plants and large residential areas) the construction, operation and modification of which, together with modifications to existing category 1 projects, may be subject to EIA if certain criteria (eg. size) are surpassed. These criteria may be determined by the individual Member States. The draft directive also lists criteria to determine whether or not projects not included in the two categories should be subject to EIA. These include:

- (a) the environmental sensitivity of sites having regard, in particular, to:
 - the relative abundance of resources: water, air, soil, landscape, flora, fauna, built-up environment;
 - the quality of these resources;
- (b) location in densely populated areas;
- (c) potential for pollution;
- (d) risk of accidents.

Were the draft directive to be approved it seems certain that EIA would be linked to the land use planning system in the UK since this is the principal prior approval mechanism for projects in this country. Such linkage could be achieved without major legislation and should not cause substantial disruption to existing administrative procedures. EIA would therefore be administered by the Department of the Environment (DOE) (and its equivalents in Wales, Scotland and Northern Ireland) which would be responsible for the choice of criteria and the adequacy of compliance with the directive. It is possible that the European Commission will extend EIA to plans at a later date.

BRITISH ATTITUDES TO ENVIRONMENTAL IMPACT ASSESSMENT

There has been considerable interest in EIA in the UK for several years. Indeed, there is a growing lobby in favour of its use. Dobry, in his report on the development control system, advocated that, in the case of specially significant development proposals, the LPA should be able to insist that an impact study be submitted.⁽³⁾ This would have dealt with, among other things, the proposed development's effect on noise and air pollution levels. The Royal Commission on Environmental Pollution agreed that there was a need for 'developers to provide an assessment of the effects of air, water, wastes and noise pollution of certain major developments'.⁽⁴⁾

Aberdeen University were commissioned by the government in 1973 to produce a manual for the assessment of major industrial applications by LPA's within the existing framework of planning control and other statutes. The DOE sent a complimentary copy of the report⁽⁵⁾ (which was effectively an EIA handbook) to every local authority in the country and commended it for use by planning authorities, government agencies and

developers. The DOE also appointed Catlow and Thirlwall to investigate the need for environmental impact analyses in the UK. Their report favoured the introduction of EIA and suggested a number of legislative means for its introduction.⁽⁶⁾

The last government deliberated a long time over the latter report.⁽⁷⁾ Finally, however, it guardedly announced that it favoured the limited use of EIA:

We fully endorse the desirability, as set out in the Thirlwall/Catlow report of ensuring careful evaluation of the possible effects of large developments on the environment The approach suggested in Thirlwall/Catlow is already being adopted with many ... public and private sector projects. We should therefore wish to encourage use of this approach in cases where its use is worthwhile in the circumstances ... The sensible use of this approach through the co-operation of all concerned, should, I believe, improve the practice in handling these relatively few large and significant development proposals.⁽⁸⁾

The present government has been equally cautious and no official policy statement has yet been issued. There are indications, however, that their position may be similar to that of its predecessor.

The Town and Country Planning Association, a long established and respected amenity group, has called for the introduction of EIA following its experience of the Windscale inquiry into the recycling of spent nuclear fuel. The planner's professional body, the Royal Town Planning Institute, in its evidence on coal to the Commission on Energy and the Environment and in response to consultation on an earlier European Commission draft directive, has strongly advocated the use of EIA. The Scottish Branch of the Institute has been convinced by its experience of a variety of recent large and complex developments with significant environmental effects that stronger planning powers are needed and recommends the use of EIA.

Advocates of EIA are not confined to national organisations. In its evidence on coal to the Commission, Barnsley Metropolitan Borough demanded EIA of both deep-mined and open-cast coal extraction. The managing director of BP has been quoted as saying:

One thing we have learned from our international experience is the value of the EIA, anticipating well ahead of the activity what the environmental consequences might be.⁽⁹⁾

British Gas has also found EIA to be a valuable tool in project planning and believes that it produces significant advantages over previous methods, not least by minimizing delays. Opinion in favour of EIA is by no means unanimous, however, and the Confederation of British Industry has argued cogently against it on the grounds of expense and delay.

DUTY OF LOCAL PLANNING AUTHORITIES TO CONTROL POLLUTION

The 1971 Town and Country Planning Act makes all new developments subject to planning permission and requires local planning authorities to produce plans in which the

projected land use patterns for their areas are set down. 'Structure' and 'local' plans are basically the responsibility of the counties and districts respectively.

Planning decisions by their very nature have a definite effect on pollution. Because pollution originates as waste from production and consumption activities, one of the key variables in pollution control — the geographical point at which additional waste is created — is determined once the location of these activities has been established. Therefore, because of their control over land use, LPA's exercise an important influence on the spatial origin of wastes and consequently upon pollution levels and their distribution. Planning control may sometimes extend to cover the processes employed, the treatment of wastes and both the location and method of waste disposal. Distribution of sensitive pollution receptors (housing, hospitals, schools, etc.) is similarly influenced by planning policies and decisions.⁽¹⁰⁾

The legal and administrative framework of land use planning provides considerable powers for pollution control. Not only do LPA's possess a number of statutory powers for control, but certain responsibilities are incumbent upon them. The 1971 Town and Country Planning Act makes it a duty upon LPA's to include measures for the improvement of the physical environment in structure plans. A subsequent memorandum stipulated that this requirement should be interpreted in a broad sense and be related to the need to combat pollution. Similar measures may be included in local plans.

The noise and, especially, air pollution arising from different industrial uses of land are taken into account in the distinction made between light, general, and special industrial buildings in the Town and Country Planning (Use Classes) Order 1972). Industrial and other land uses are grouped to ensure that LPA's are able to control changes of use which might give rise to pollution and other environmental problems. The Town and Country Planning General Development Order (1977) specifies that LPA's must consult regional water authorities when certain types of development are proposed and must take their opinions into account. LPA's are required to advertise applications (which clearly have pollution implications) to deposit solid and other wastes on land.

A number of government circulars issued by the DOE provide advice on pollution control at both the plan making and development control stages of the planning process. Various circulars advise liaison with the Alkali Inspectorate and environmental health departments when preparing plans, or when faced with an application which may fall within these authorities' spheres of interest. A circular on planning and noise gives specific advice about planning measures for dealing with aircraft, traffic and industrial noise in both plan making and development control. It leaves LPA's in no doubt that theirs are the only effective anticipatory noise pollution control powers. Other circulars relate to planning control over solid wastes and odours. The most recent circular on planning and pollution can be interpreted as effectively requiring LPAs to reduce the relative importance of pollution in making decisions in order to give priority to industry. In particular, it warns against the use of planning conditions to abate pollution which is subject to control under separate environmental legislation.⁽¹¹⁾

It is apparent that LPAs do, in fact, possess a veritable armoury of powers and responsibilities for controlling pollution and that there have been several changes in emphasis in the instructions handed down by central government over the last few years. These instructions, however, still lack any distinct form. In the absence of firm policy guidance, decisions involving pollution are still left very much to the discretion of the LPA or Secretary of State.

LAND USE PLANNING AND POLLUTION CONTROL IN PRACTICE

There is evidence that the formal powers and responsibilities of LPA's to control pollution have not always been fully utilised at either the plan making or development control stage.⁽¹⁰⁾ A number of detailed case studies conducted at Manchester University show that disturbing environmental consequences have resulted from inadequate development control recently. The construction of some 600 houses on a former industrial site in an inner city with a steel works on one side, a dyestuffs works on a second side and an organic chemical works on a third side seems destined to leave the tenants to suffer undesirable noise and air pollution levels⁽¹²⁾. Indeed, the houses are now being double glazed to reduce noise.

In another town, a sulphuric acid plant was located in a predominantly residential area and frequently emitted substantial quantities of sulphur dioxide which, particularly on start-up or during break-downs, generated elevated concentrations of pollutant which damaged fabrics and motor vehicle paintwork and caused severe coughing.⁽¹³⁾ Again, the location of a major new residential estate adjoining an existing oil refinery has led to undesirable pollution levels. The decision to permit this development has been referred to by a government inspector as "the height of folly" and "perpetuating the worst effects of the industrial revolution of 150 years ago".⁽¹⁴⁾ The Alkali Inspectorate was not consulted by the planning authority in any of these cases.

The juxtaposition of new housing and an active waste disposal site with many years' capacity (without adequate consultation by the district and county involved) seems certain to leave a legacy of noise, odour and complaint lasting several years. In another instance where the planning control of pollution was less than effective, the construction of a molybdenum smelter close to houses in an enclosed valley has led to elevated sulphur dioxide concentrations, frequent complaints and the creation of a formidable action group attempting to rectify the situation.

While the number of such instances has undoubtedly decreased during the last decade, decisions likely to result in very serious pollution problems are still sufficiently numerous to prove that the full scope of planning powers and responsibilities for abating pollution is not being fully employed. There are several factors involved but three appear to stand out. The first is uncertainty about the precise legal standing of planning powers (including conditions) to control pollution. The second is the attitude of elected representatives who frequently ignore planners' (and by implication, Environmental Health Officers') advice and who may tend to relegate pollution problems in comparison to other planning matters unless they are forcefully reminded of their importance. The third is the

cost of pollution abatement, whether it be in terms of money, numbers of jobs lost, numbers of houses foregone or some other calculable disbenefit.

Apart from the inadequate use of available planning powers, serious pollution problems can be caused while the LPA is powerless to act. For example, a chemical formulation plant was set up in a former carpet factory beside a Class 1 river without planning permission being required as this was a permitted change of use. Spillage of the chemicals involved could have very serious implications for fish life and the water authority is extremely concerned about the situation. Response to questionnaires and at workshops⁽¹⁵⁾ indicate that the lack of control over pollution generated where permitted development or intensification of use takes place without requiring planning permission is regarded as a serious problem by many local authorities.

Various suggestions have been made to overcome the difficulties of planning control.^(10, 12) The Royal Commission on Environmental Pollution felt there was scope for considerable improvement in planning control over pollution:

Our concern is not that pollution is not always given top priority; it is that it is often dealt with inadequately and sometimes forgotten altogether, in the planning process.

They recommended improvements in planning policies, in the use of planning techniques and in consultations. Further, they suggested that certain planning powers and responsibilities should be extended to improve the control of pollution. As mentioned above, they felt that statements describing the probable environmental significance (including an assessment of pollution effects) of some proposed developments should be required, and these statements published.⁽⁴⁾

ENVIRONMENTAL IMPACT ASSESSMENT AND POLLUTION CONTROL

The proposed content and procedure of the European Commission EIA system should ensure that the pollution implications of any proposed development are fully explored, since the various emissions, concentrations and effects anticipated not only have to be assessed, but the assessment has to be made available to the public, who would criticise it if it was inadequate. Given its parallel provisions on topics other than pollution, it is therefore little wonder that EIA has been regarded with interest by many concerned with the British environment. It is, of course, quite possible that, despite an EIA which revealed adverse environmental pollution consequences, a decision would be taken to proceed with the development, since an EIA is only one component in the decision-making process, and other factors (eg. economic) might outweigh the environmental ones. In this event, however, the pollution implications would have been fully considered and not ignored or neglected. The more likely eventuality is that modifications to the project would be made to render it more acceptable, for example, by redesign, by means of rearrangement within the site, by the use of better pollution control equipment, by means of better insulation, etc.

It is instructive to consider the likely outcome in the case studies mentioned above,

had the current European Commission draft directive been in force at the time. It seems very probable that, had EIA been used in reaching decisions on the sulphuric acid works and the molybdenum smelter, the result would have been different, as the pollution consequences would have been foreseen with at least a reasonable degree of accuracy. The most likely outcome would have been refusal of planning permission but, as a minimum, process or pollution control modifications would have been introduced. Both of these projects would be subject to EIA under the European Commission proposals (category 1).

It is less clear that the oil refinery and inner city housing decisions would have been revised under the proposed EIA procedure, since its emphasis is geared entirely to the effects of projects on the environment rather than the effects of the environment on the project. However, it is possible that, had an EIA been carried out, as it probably would be under the current proposals (category 2 includes large residential developments), the description of the environment and review of existing plans and standards (2 and 4 above) would have revealed the adverse effects upon the development and, perhaps, caused the projects to be abandoned.

Ironically, landfill sites are not included in either category of project, but the pollution problems created by the proximity of waste disposal operations and the housing development might have been anticipated in the same manner. Since neither of these EIA topics includes the future situation (unless it is covered by an up-to-date plan) it is less than certain that the decision would have been different.

Waste disposal sites and large housing developments (if not included as category 2 projects due to the choice of criteria — presumably set by the DOE in England) might well be judged against the European Commission's screening criteria (above). In this event, the outcome in all three cases might have been different, since the information revealed by an assessment of existing (or forecast) air quality would obviously have highlighted the probable pollution problems. Unfortunately, however, although other types of pollution sensitive development such as hospitals or schools might be subject to EIA under these screening procedures, this appears likely. Consequently, EIA would probably not help to prevent the location of such developments in polluted environments if the current European Commission proposals are adopted.

It is possible that the change of use to a chemical formulation plant might never have been permitted under the European EIA proposals, since the construction, operation or modification of:

plants for the production and treatment of fine chemicals, dyestuffs, active ingredients for the preparation of pesticides and pharmaceutical products, paint and varnishes, elastomers and peroxides

would be subject to EIA. Thus, this plant would have been assessed, provided it met the criteria employed for this type of category 2 project, since 'operation' is involved, and its activities would probably have been barred. This 'operation' criterion would thus be a means of overcoming the difficulties created where permitted changes of use lead to pollution problems.

Similarly, 'modification' of projects is included within category 2 and this could enable pollution problems caused by intensification of use to be avoided since a decision would have to be reached on the basis of the EIA (again if it met the relevant criteria) and would no longer escape the land-use planning net. EIA could thus be a means of overcoming many of the short-falls of the British system of planning and pollution control, as regards new pollution sources, new developments susceptible to pollution, and both changes and intensification of use which lead to pollution problems.

CONCLUSIONS

EIA has been accepted in the US as a means of improving the effects of many decisions on the environment. The European Commission's proposed EIA directive would be binding on the UK and would almost certainly be linked to the land use planning system. EIA procedures are widely accepted by those concerned with the environment, including many planners. LPA's have a number of powers and responsibilities for controlling pollution but there are serious deficiencies in both the scope of their controls and in the way in which they are exercised in practice. While it is possible to overcome many of these problems by improved practice and by such means as the withdrawal of permitted development rights and the use of planning agreements, EIA should improve the environmental quality of development decisions.

EIA could remedy many of the deficiencies identified by ensuring thorough, public, deliberation of potential pollution problems and by expanding the scope of surveillance of new development (eg. to cover certain permitted developments and intensification of use). How effective EIA is in this respect depends both on the final form of the directive and the way in which it is adapted to the UK (ie., on the precise choice of projects and criteria and on the extent of compliance). It is important that those involved consider the utility of EIA in anticipating and reducing pollution problems and, in particular, its extension to include sensitive developments in polluted environments.

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BONFIRE SMOKE

The National Society for Clean Air would be interested to hear from any local authority which has made bye-laws to deal with the problem of smoke from garden bonfires. Please contact Miss Jane Dunmore, Information Officer (Tel: Brighton 26313)

DIARY OF EVENTS

10. July (Thursday)

p.m.

Meeting of the Technical Committee

16 July (Wednesday)

a.m.

Meeting of the Council of the Society

p.m.

NSCA Annual General Meeting

Both meetings at NCB, Hobart House, Grosvenor Place, London SW1 (Room 16)

24 July (Thursday)

a.m.

Meeting of the Parliamentary and Local Government Committee

11 September (Thursday)

a.m.

Meeting of the Conference and Publicity Committee

p.m.

Meeting of the General Purposes and Finance Committee

BOOK REVIEWS

"Chlorofluorocarbons in the Environment – The Aerosol Controversy"

Ed. T.M. Sugden and T.F. West — Ellis Horwood, 1980, pp. 183; and

"Chlorofluorocarbons and their Effect on Stratospheric Ozone"

Pollution Paper No. 15, HMSO 1979, £4.75.

In October 1978 the Society of Chemical Industry held a conference, and Sugden and West's book presents the papers with the significant parts of the discussion which followed their presentation.

Many conference volumes are collections of submitted papers and therefore do not make a unified text. In the present case the editors have performed a masterly task of gathering together highly authoritative papers which tell a fascinating story. The aerosol controversy had been turned by the media, by some specialists whose knowledge of the whole subject is so narrow as to be blinkered, and by enthusiastic but inadequately informed self-styled environmentalists, into an emotional issue where reasoned discussion had been rendered virtually impossible because of the stances adopted in advance.

Dr Sugden is to be congratulated for the way in which he has brought the discussion back to a proper scientific level. The conference was the climax of a series of discussions of a panel which he chaired, and his efforts have helped the official publication of same topic, namely Pollution Paper No. 15, to maintain the same high level of scientific integrity. The outsider is now able to understand better where the state of human knowledge now stands. Indeed it is characteristic of our age that final answers are publicly demanded where none can be given, and absolute principles and extreme policies are used as a substitute for knowledge in formulating viewpoints. *The Times* said of Prof. Lawther's report on lead in the environment that "it will satisfy no-one". To satisfy everyone or a particular group was not its purpose, and, as Lord Ashby pointed out, when particular answers are demanded in advance, the first casualty is truth if the demand is to be satisfied.

To understand the situation requires serious reading, and these two books present the necessary material in about as small a space as possible. The original thesis that the chlorine liberated by the photolysis of chlorofluorocarbons would cause a decrease in the total ozone of the stratosphere was based on pure photochemistry. It was assumed that because the time scale of the atmospheric motions was months or at least days while the time required to achieve photochemical equilibrium was hours or even only minutes, the meteorological motions would have little effect on the equilibrium state.

That naive idea was based on the assumption that the stratosphere was well mixed. It was then necessary to assume that materials were carried upwards and downwards in the stratosphere by diffusion, and that the diffusion could be represented by a diffusion coefficient. This "model", which, it should be said, is still being used, is quite wrong when applied one dimensionally, that is when it is assumed that the atmosphere as a whole behaves like a single column, for it assumes that any chemical species travelling upwards by diffusion will react, if possible, with any species coming down. Thus it fails to contain the possibility that air may go up in one place and come down in another, and

because meteorologists have known that this is basic to the circulation of the atmosphere they have, from the beginning, been sceptical of conclusions drawn from the 1D models.

Actually the 1D models are not even self-consistent because it is now found (as meteorologists expected) that as more information about the distribution of different chemical species is obtained, each is found to require a different coefficient. In the early days about six different researchers got the same conclusion about ozone depletion and thought that this meant it must be correct, whereas it merely meant that they had all done the same calculation. At least this obvious fact is now recognised by some of the people concerned.

The photochemistry itself is extremely complicated, and as new reactions have been included in the calculations the amount and rate of ozone depletion predicted has gone up and down in an unpredictable manner. We can expect a few more reactions to become recognised, together with a few changes in the reaction rates, because from this cause alone there is still a possible error in the answer of a factor of two or three either way.

But the answer is wrong because it is based on a model known to be fallacious. These two books record the attempts to provide a better model. Dr Murgatroyd's article in Sugden and West's book is a very clear description of the enormous complexity of the real motion of the atmosphere and represents the outcome of many years of serious study begun long before the frivolities of spray cans were contemplated. Given that background Pyle and Houghton, at Oxford, have produced a revealing two-dimensional model. This can be operated in two ways, by assuming the motions to be as Murgatroyd describes and calculating the new distribution of ozone consequent upon the release of the chlorine components, or by including the further complication that the new distribution of ozone affects the motion and making some allowance for that. This latter exercise is very difficult because the motion is really three-dimensional and the computing required to include the photochemistry in a 3D dynamical model is beyond present day computer capacity.

Nevertheless Pyle and Houghton have clearly demonstrated that even in a 2D model the distribution of ozone is found to have many important differences from the 1D model. In particular the depletion occurs mainly where it does not matter, namely in high latitudes in winter.

It must also be realised that it is not simply a matter of having more computer capacity available to get an answer with a 3D model, for it is necessary, in the present state of knowledge, to use the dubious method of representing transport of species by the air motion by a diffusion coefficient in respect of the smaller scales of motion in the atmosphere about which our knowledge is more or less non-existent for the stratosphere. This is not a trivial matter, but one can say with some confidence what we cannot say about new information concerning the photochemistry, that the introduction of realistic representation of the motion into the model will show a decrease in the calculated ozone depletion. This is because the mechanism becomes more and more nonlinear and more feedback mechanisms are introduced which have the effect of keeping the outcome closer to the present state when a disturbance, in this case of chemical composition, is introduced.

In the case of ozone it is inevitable that the feedback mechanisms will decrease the disturbance because it is already the major factor in determining variations of stratospheric

temperature and the system is at present stable. Very probably the day to day and month to month variations due to the motion will always far exceed any perturbations due to chemistry. The problem will therefore gradually fade away as we have a more accurate model to base our calculations upon.

But was there a problem anyway? Certainly there was, and still is, a human problem. Pollution Paper No. 15 does not presume to discuss it. For people it is easier to discover a new problem, a new threat of horror which can be prevented, than to deal with the old failings of our society. It is more interesting too, and more fun for less effort. It is probable that the anti-smoking campaigns have already saved people from more distress each week than would have occurred in a century had the early predictions of the ozone scare actually come true. The threats of effects of the theoretical ozone depletion on climate are quite fictitious at present, and it is just as likely that any changes that might be caused would be beneficial to humanity, and there is still much more to do in connection with smoking. Likewise smoking and smelly traffic fumes and noise represent a great blight on our civilisation and yet relatively little effort on the part of pressure groups is directed against them. And in so far as the predictions of doom from spray cans and other trivialities seem to be discredited prediction itself ceases to be trusted. In consequence the important messages about fuel depletion and excessive population are diluted. If half the effort of investment in and protest against nuclear power were directed to reducing consumption and conception we might have progress to be proud of.

That is not to say that the part of Sugden and West's book which is devoted to the non-meteorological aspects is of no importance for it helps to get the whole environmental issue in correct perspective. Dr Mole's essay on skin cancer is very clear and helpful, and we are reminded that whatever the outcome of the ozone argument other factors which have excited next to no attention are much more important. The final three chapters on the industrial viewpoint are also worth attention, because the people who run the industry which provides most of our wealth have as valid a viewpoint about the value of their work as any environmentalist.

For the future it can be expected that the scientists involved in the dramatic argument will mature along with society and this environmental episode will recede from the headlines as its complexity becomes more widely understood. The meteorologists will give a shrug at the flurry which hurried along one branch of their subject for a brief spell. Perhaps they would have preferred a different allocation of resources, but they weren't asked. Stratospheric research is so expensive and vast a field that we could only smile at the suggestions made in 1975 that the problem would be sorted out in two or three years.

R. S. Scorer

Land Use Planning and Pollution Control in Practice. C. Wood and N. Pendleton, pub. Department of Town and Country Planning, University of Manchester. Occasional Paper No. 4, 1979. 70 pages. £1.00 (incl. of p & p).

The paper records a study of the effectiveness of land use planning powers in regulating land use activities of pollution significance in Manchester. The authors — Christopher Wood, lecturer in Town and Country Planning and Nicholas Pendleton, Trade Effluent Inspector, Anglian Water Authority — have drawn upon Manchester Corporation's records and interviewed the various people concerned. The approach throughout is docu-

mentary and the authors' experience enables them to draw conclusions about the chain of events in the two case studies presented (chapters 8 and 9) which should be valuable to many involved in planning, development and pollution control.

Chapters 1 to 7 give a comprehensive background to the two case studies of developments in the Bradford and Openshaw districts of East Manchester. The history of air pollution control in Manchester is described, followed by an account of how the various regulatory authorities currently exercise control within the Greater Manchester Metropolitan County. Air pollution levels and likely trends are reviewed and chapter 7 outlines the social, topographical and pollution characteristics of the environs in the Bradford and Openshaw districts.

The first case study concerns the development of an iron and steel works — a 'mini-mill' — two miles from the centre of Manchester, focussing on the roles of the Planning and Environmental Health Departments in the granting of planning permission. The second concerns the construction of almost 400 houses on an erstwhile industrial site in a heavily industrialised part of Manchester. In this case the Corporation was its own developer and the report explains the reaction of neighbouring industrialists to the plans and outlines the appraisal of pollution problems, particularly noise, made by the Environmental Health Department.

In both case studies the roles of the various protagonists are closely examined and attention is paid to political and economic influences as the course of events unfolds. Both are concluded by discussions and observations on how the pollution implications of each development were handled. The final chapter presents the conclusions from the research, and while it is pointed out that these were drawn in a limited context, they may be applied more widely in the light of the recommendations of the Royal Commission on Environmental Pollution in their Fifth Report, dealt with in chapter 2 of the paper.

DOUBTS RAISED ON OPENCAST COAL EXPANSION

Serious doubts about the effects of opencast coal mining are raised in a report **SCAR ON THE LANDSCAPE? A Report on Opencast Coal Mining and the Environment**. Published by CoEnCo, Price £3.40 (post free), from the Council for Environmental Conservation.

The Council, known as CoEnCo, commissioned the report from a Working Party which it set up following an announcement by the National Coal Board to expand opencast production from 10 to 15 million tonnes annually by 1985. In view of this proposed expansion, the Working Party wanted to ensure that the most satisfactory subsequent restoration of the land involved would take place.

The study is an in-depth appraisal of the industry with particular reference to its past and future effects on the environment. The CoEnCo Working Party says it recognises that opencasting has developed over thirty years with a clear mandate to restore land after working, but in a Foreword to the Report Lord Craigton, Chairman of CoEnCo, says: "There is no doubt that opencasting has a major effect on the landscape. It destroys its features, its wildlife habitats and affects the soil for many years".

The issue is undeniably complicated as concern about a potential energy crisis and the need to seek alternative sources of fuel has grown side by side with an increased public awareness of the need to conserve the environment.

Opencast coal mining was until recently mainly localised around former deep mined sites, but now, the report says: "is impinging increasingly on the environment as coal reserves under existing derelict land are worked out and applications are made to move into land of higher agricultural and scenic value, such as that at Oughterside in the Ellen Valley, Cumbria".

The Working Party makes some 30 principal recommendations, from general planning policies to practical guidelines for work on the ground; the Working Party intends to follow these up with the NCB Opencast Executive.

Three of the main recommendations are:

"The planned increase in opencast production makes it essential that the Executive should work to a medium to long term plan, reached after consultation with the County Planning Authorities".

"It is of cardinal importance that the social, agricultural, forestry, ecological and general environmental values of land to be opencasted should be fully assessed **before** it is disturbed".

"A comprehensive opencast research programme should be set in hand. An informal panel of advisers drawn from the various scientific and professional disciplines should be set up to identify and review the problems arising from opencast operations and to suggest appropriate research".

A.C. A. I. Controls -

NSCA Response to Proposed Amendments

Consultative Document — Proposal for Amendments to the List of Scheduled Works and Noxious or Offensive Gases — NSCA Response

The Society is composed of many different interests of which the bulk are made up of representatives from local authorities and from industry. Generally industrial members did not favour any changes which could, in their opinion, have an adverse effect on uniformity.

On the other hand, all local authority representatives made the point that they were not in favour of any changes which would erode their present powers and duties: they did not wish to be subject to any further controls by Central Government. They were in favour of extending their influence by acting as an "agency" on behalf of Central Government where appropriate, as was recommended by the Royal Commission on Environmental Pollution in their 5th Report.

More specifically, the Society submitted the following detailed comments on some of the proposed alterations:

(a) **Asbestos Works**

Local authority members expressed concern at the possible diminution of their

interests and activities in connection with asbestos works, especially the monitoring of the external environment round such works.

(b) **Cement Works**

Some major local authorities which have experience of the cement manufacturing industry would like to exercise more control over cement works on the "agency" basis already referred to, although it is recognised that there are problems with cement works which are not just those of dust and which, in some cases, are beyond the scope of some local authorities. However, it is considered that generally there is a case for a greater degree of local authority involvement where the local authority concerned has the necessary expertise.

(c) **Chemical Incineration Works**

Interest shown by the Alkali and Clean Air Inspectorate in the problems of Chemical Incineration Works is welcomed and it is hoped that the greater knowledge of the Inspectorate will be passed on to local authorities to help them in the control of smaller incinerators outside the scope of this proposal. It is further suggested that the large incinerators owned and operated by some local authorities, (e.g. County Councils in England) should come under the control of the Alkali Inspectorate.

(d) **Electricity Works**

A point of specific interest is the addition of gaseous fuels in definition (a) of "Electricity Works" and the dropping of the phrase "to raise steam" which brings gas turbine power stations formally under the control of the Alkali Inspectorate. It is suggested however, that there are errors in the Notes (Appendix III) in this respect; gas turbines burn a light distillate oil, not in a furnace as stated, but in an internal combustion engine. The impression may be given that gaseous fuels are used in this plant. Generally however, the scheduling of gas turbines has been long awaited by the CEGB and their inclusion is a welcome rationalisation.

(e) **Iron and Steel Works**

Those local authorities familiar with cold blast cupolas consider that they have sufficient expertise to deal with the control of emissions from these plants. They therefore see no reason for the proposed removal of cold blast cupolas from their control. In fact, the local authorities would welcome the strengthening of legislation by implementation of the recommendations of the Second Working Party on Grit and Dust.

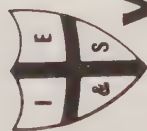
(f) **Lead Works**

The main concern with regard to the proposed changes is that it is sincerely hoped that these will not mean any reduction in the monitoring of the external environment carried out by local authorities as this is considered to be of particular importance. (See paragraph (a) above).

(g) **Metal Recovery Works**

It is strongly suggested that these small plants in which metal is recovered from scrap cable by burning the insulation, should be descheduled and made the responsibility of local authorities.

(continued on page 99)



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Monitoring of Environmental Lead – Dr A C Turner, Warren Spring Laboratory

Redevelopment of Contaminated Land – Mr M A Smith, Department of the Environment

Report on West Midlands Division Seminar, West Bromwich, Wednesday 30 April 1980
by Jane Dunmore

About 60 people attended the seminar, and this excellent turn-out obviously reflected members' interest in the subjects for discussion. The seminar was held in the Council Chamber, Town Hall, West Bromwich, and the proceedings were opened by the Chairman, **Councillor G T Randall**, at 10.30 am. After welcoming the audience, Councillor Randall introduced the first speaker, **Dr A C Turner of Warren Spring Laboratory**, who gave a talk on the monitoring of heavy metals in air, with particular reference to recent work on environmental lead pollution. The results given were a very condensed version of those reported more fully in Warren Spring Report LR 344 (AP), 'The determination of environmental lead near works and roads, in conjunction with the EEC blood-lead survey, 1978-9' by Turner and Carroll, now in preparation.

Dr Turner explained that the background to the work on monitoring environmental lead was the UK commitment to the biological screening of the population for lead, in fulfilment of the EEC Directive 77/312/EEC. (The UK blood sampling campaign was carried out in 1979 by local medical and environmental health authorities on different groups of people and co-ordinated by the Department of Health and Social Security; Department of the Environment was responsible for the environmental programme mounted in addition by the UK.) This blood lead survey provided an excellent opportunity to check environmental lead levels against blood lead levels in the population, to determine, firstly whether any relationship could be found between blood lead levels and environmental levels of lead, and secondly, to have a reference for comparison of future environmental measurements with past determined levels. For this purpose, monitoring sites were chosen near lead works or main roads, where blood sampling subjects lived. The sites were located so as to cover the range of likely exposures, from very close to the source out to unaffected areas.

Two pilot surveys were carried out during 1978, at Welwyn Garden City and in Southwark. Both these sites were near lead works but not specifically near busy roads.

The work on the determination of concentrations of lead in air was carried out using an Extended National Survey sampler, with a $0.8\text{ }\mu\text{m}$ pore size millipore membrane filter and no inlet tube (therefore deposition was straight on to the filter). The filter head was most commonly mounted on a modification of the ISO deposit gauge stand; this was usually deployed in back gardens or on flat roofs, and held in place with building blocks or spikes.

Describing work undertaken on deposition rates, Dr Turner explained that wind tunnel tests had been carried out on the BS 1747 deposit gauge and it had been found that this apparatus had several disadvantages, including a risk of re-entrainment of particles of certain sizes which would introduce a fair risk of systematic undersampling. The ISO, or horizontal, deposit gauge had been proposed by the International Standards Organisation

to overcome such problems; this apparatus is deeper with liquid at the bottom to cut out the risk of re-entrainment. In order to prevent algal or bacterial growth, a non-toxic additive was used. The ISO horizontal gauge measures roughly 200 millimetres across and 400 millimetres in depth, with a bird guard on top of the apparatus. It is now commercially available.

WSL decided to use the ISO gauge, both in order to ensure satisfactory data within the survey and, assuming its adoption internationally at a later date, to provide a good data base for future work. Only particulate inorganic lead was determined, not tetraethyl lead.

Work on sampling levels of deposited lead also involved studies of levels indoors. Carpet dust was sampled, using a powerful Nilfisk vacuum cleaner with a 105 mm dia. glass fibre filter at the front. The samples were taken in an area of maximum usage where it could be expected that children would spend most time. The sample area was standardised by using a template cut out of an aluminium sheet.

Sampling sites were restricted to locations in areas where people were living who were having blood leads taken at a later date. This therefore resulted in an apparently patchy sampling pattern. Only works where there were houses within 500m were examined; beyond this was considered a background area. (Within a distance of 250 metres from the works influence was definitely felt to exist, and the intermediate zone of 250-500 metres distance was also felt to be of interest).

After the pilot studies, sites were chosen in Abbey Wood, Greenwich, in Chester and in Market Harborough, where in all three cases there were works in the middle of residential areas; at Thorpe near Leeds, where housing was scattered in small pockets in all directions; and at Dartford, where there were houses within 300 metres of the works. A full sampling pattern, on an approximately East/West axis, was not always possible. Where houses surrounded the works, two samplers were sited in the inner area (up to 250m distance from the works), two in the intermediate area, and one outside the supposed 500m boundary of influence. At the Dartford site, there was a housing area near a main road to the south and two samplers were positioned to give a general pattern of pollution; two samplers were sited at flats south east of the works, one at ground level and one on a rooftop, to determine whether there were lead emissions which did not reach the ground. At Thorpe, three samplers were located in various directions reflecting the scattered distribution of local housing.

Sampling was undertaken near the M4 and near the North Circular road in Neasden, both roads having a heavy throughput of traffic. The three zones of interest were now the first row of houses, up to, and more than 100m from the carriageway. It was not found practicable to sample between the houses and the road at Neasden because of the risk of vandalism, which is in fact the most important constraint on the location of ambient samplers.

Roadside dust samples were also collected. In contrast to other samples which were collected where people lived, these were geared to the road pattern around the works. Although this sampling method is cheap and unsophisticated it gave some of the most interesting results found.

Filter samples and road dusts were analysed by X-Ray fluorescence, calibrated by atomic absorption, to allow quick, relatively cheap handling of a large number of samples. Deposit gauge and carpet samples were analysed by atomic absorption following acid extraction.

With one exception, airborne concentrations were higher at sites near works than near roads (Fig. 1). The ISO gauge gave similar results (Fig. 2); deposition rates near roads were modest, consistent with the bulk of the lead from vehicles being in a very finely divided form.

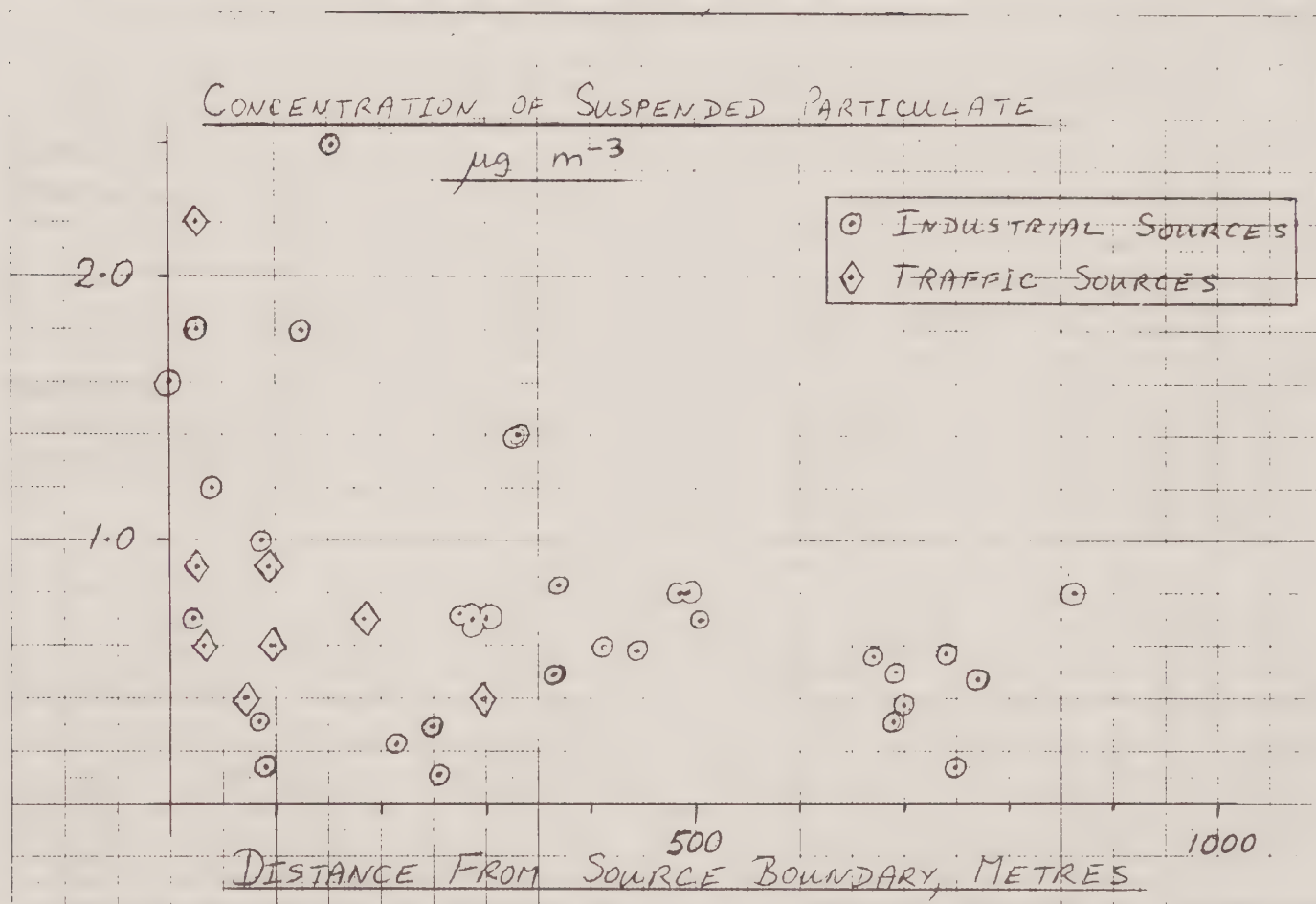


Fig. 1 Mean ambient levels, all sites

The carpet dust samples (Fig. 3) showed considerable variation between lead levels in different houses; the levels seemed to depend strongly on the pattern of housework as well as the distance of the house from the works. Away from works, all results showed fairly modest levels of lead; near works, although low levels were found, there was a much greater range and many houses with higher levels of lead. Overall, the results showed that a works could be a much more important source of lead than roads.

Road dust lead levels showed a similar pattern when plotted against the distance to the nearest point on the works boundary, with both high and low lead levels being found close to, but only low levels at greater distance from the works (Fig. 4). However, when re-plotted against distance travelled by road from the works gate, results were much more consistent around a given works, lead levels being high near the gate and low further away (Fig. 5). Furthermore, for paired samples taken from opposite sides of the road, that side

bearing traffic travelling away from the works showed consistently higher values than the 'approach' side. From this it was concluded that carriage and deposition of lead along the road by traffic was much more important than random blowing about by the wind. The Abbey Wood results have been selected since they show this most effectively; one of the approach roads in fact curves back on itself so that point X₂ lies on a flyover about 8m vertically above X₁, both being about 60m direct from the works gate; however, lead levels are much lower at X₂, about 570m by road.

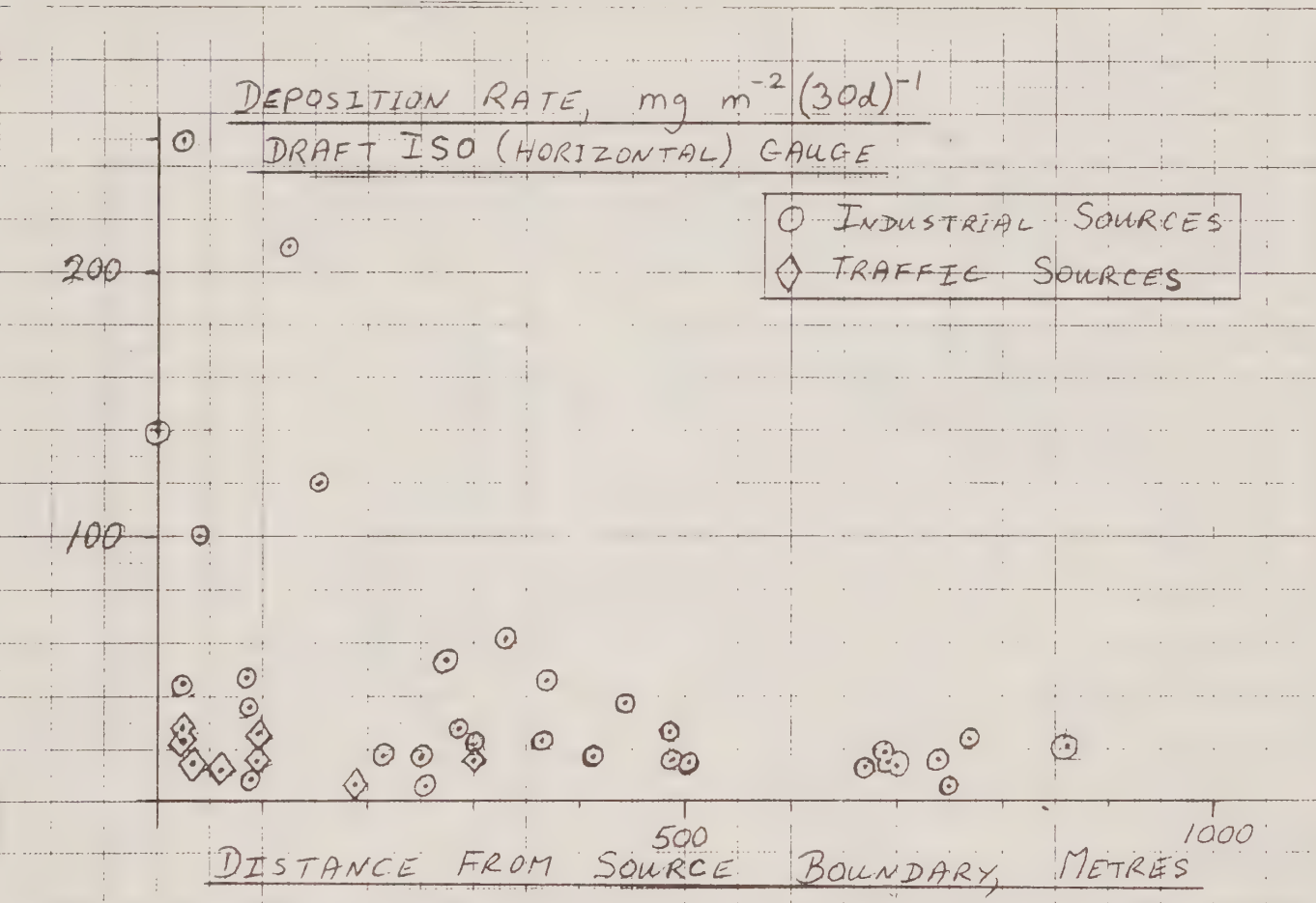


Fig. 2 Mean ambient levels, all sites

During the discussion, **Mr C C Brookfield, Hon. Secretary, W. Midlands Division**, asked whether Warren Spring Laboratory could offer assistance to local authorities undertaking similar surveys. **Dr Turner** said that WSL would certainly give advice and that this might be particularly useful with regard to methodology and the selection of sampling sites; physical assistance was much more uncertain and would depend on laboratory commitments. He did not think that the analysis of lead presented a problem, for a properly equipped laboratory, and design and location of samplers could result in much greater variations in observed concentrations; also the difficulties of experimental design and interpretation of data should never be under-estimated. **Mr Brookfield** also asked whether the results of the blood lead survey undertaken under the EEC Directive had been released. **Dr Turner** referred him to Annex II of the Lawther Report, which summarised the results so far.

Mr Treadwell of Hereford and Worcester County Council asked whether the particle size of the airborne lead had been taken into account as this might be especially important

when sampling near lead works. **Dr Turner** said that particle sizes had not been distinguished; comparability was from sample to sample depending for consistency on using the same apparatus throughout. It was fairly certain that particles below $5\text{ }\mu\text{m}$ were being collected but there was some uncertainty about those above $10\text{ }\mu\text{m}$.

Referring to studies of environmental lead deposition in other countries, **Dr Turner** said that the results of work conducted in Toronto provided the nearest comparison with the situation in the UK. The levels in the residential area examined in Toronto (with two smelters in the vicinity) were somewhat higher than those that had been found in the UK. Near the smelters the deposition was 500 mg/m^2 per month (the apparatus used was similar to the ISO gauge). The UK, of course, had had ever more rigorous ACAI control of lead works for many years. Further on the Toronto results, **Dr Turner** mentioned the work of Roberts of CERL as a reference for the build-up of lead in soil. It had been concluded in that study that a figure of 100 mg/m^2 per month lead deposition to the ground was acceptable, but this figure was open to considerable discussion.

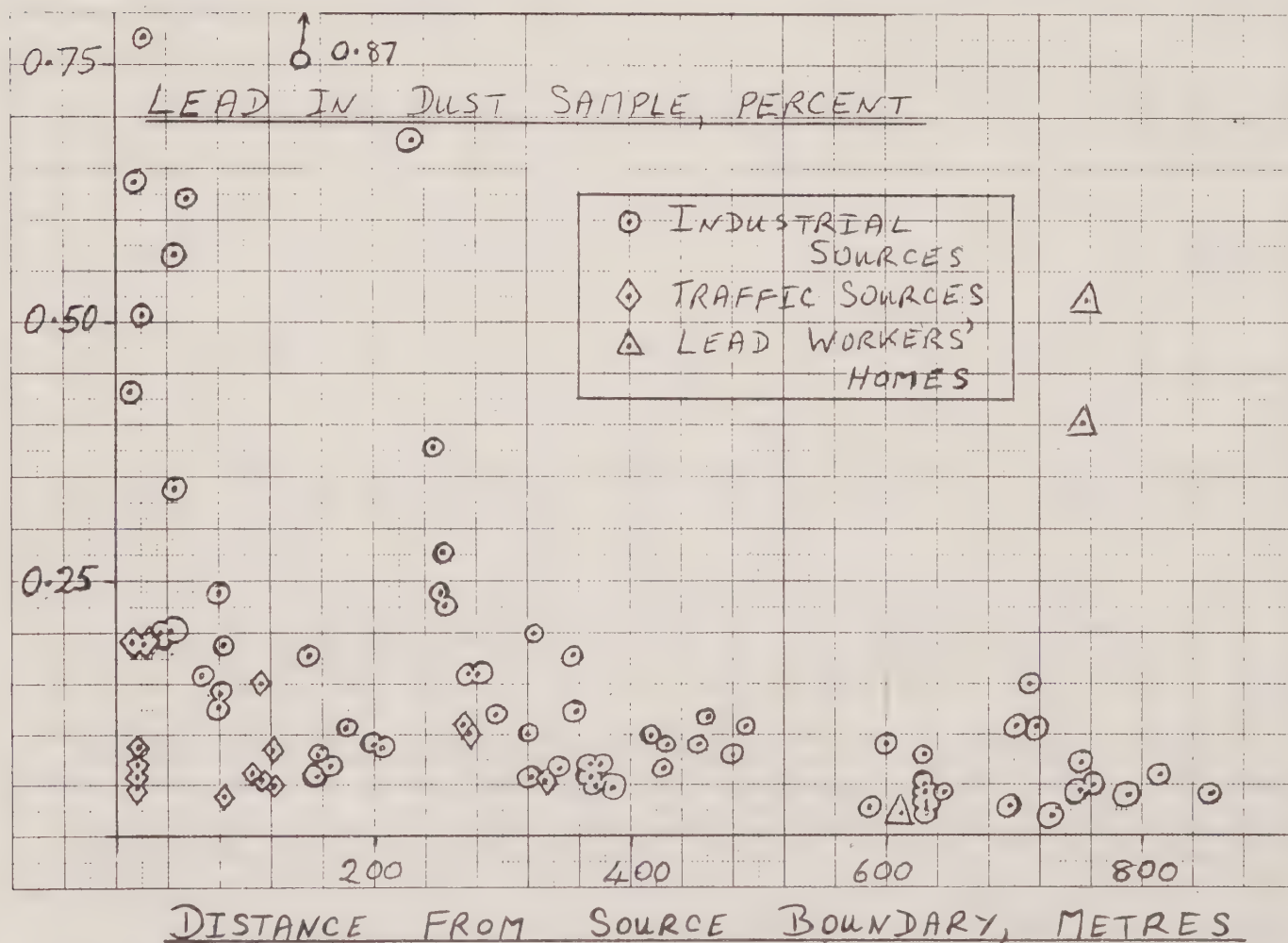


Fig. 3 Lead in carpet dust

Mr Holloway of **Stoke on Trent D.C.** asked whether plants had been sampled for lead and **Dr Turner** replied that this had not been done. **Mr Brownsword** of **Dudley M.B.C.** asked whether the use of moss bags had been considered. **Dr Turner** said that their use had been considered and rejected; a sampler which would express results in $\mu\text{g/m}^3$ was preferred and, although moss bags were good for defining hot spots, it was much less

certain how to relate results to blood leads in the population, and other measures of ambient pollution.

Mr James of **Sandwell M.B.C.** asked **Dr Turner** about the report on the third stage of the Midlands Metals Survey. (**Dr Turner** had referred to this at the beginning of his address and had told delegates that the report had been approved in draft form). **Dr Turner** explained that the survey had examined concentrations in air only and had not looked at deposition rates. Generally, lead levels found had been in line with the general urban background level of about $1 \mu\text{m}/\text{m}^3$. The work on cadmium had shown very modest levels – within 10 nanograms/ m^3 . Levels found during the survey did not appear excessively high in view of the presence nearby of hot- and cold-blast cupolas processing scrap.

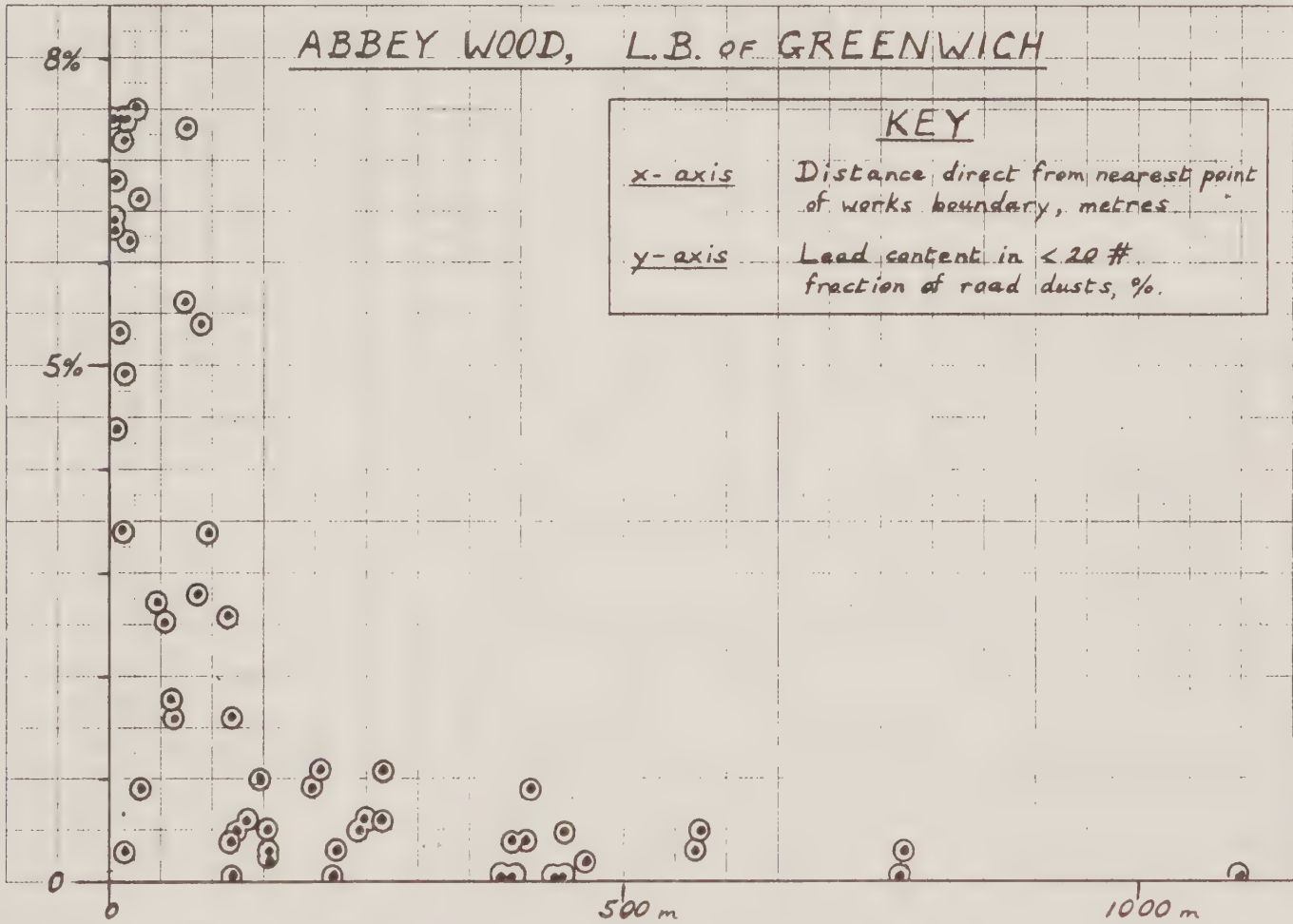


Fig. 4 Lead in road dust vs. direct distance from source

Councillor Terry Short of **Nuneaton D.C.** asked whether there was any danger to the health of children exposed to relatively low levels over a number of years. **Dr Turner** said the whole question of any possible risk from environmental lead, and the significance of blood lead levels below $80 \mu\text{g}/100\text{ml}$, was highly uncertain, as highlighted by the Lawther report. However, children of lead workers, even when living outside 500 metres from the works seemed more likely to show 'elevated' blood lead levels (that is, above the EEC specified level of $35 \mu\text{g}/100\text{ml}$) than children simply living within 500m of a works presumably because lead dust was brought home on workers' clothing or hair. Clearly, if any risk existed, it would be accentuated by pica, and personal habits presumably

accounted for the occasional case above the EEC reference level, found in blood surveys without any obvious explanation.

Mrs K J Sulway of Sandwell M.B.C. asked what area of carpet in which rooms in the houses had samples been taken from. Dr Turner replied that the samples had been taken from three locations in the living room (i.e. the room containing the television), each area sampled being 0.2 square metres. Samples had been taken just inside the door, in the middle of the room, and by the easy chair.

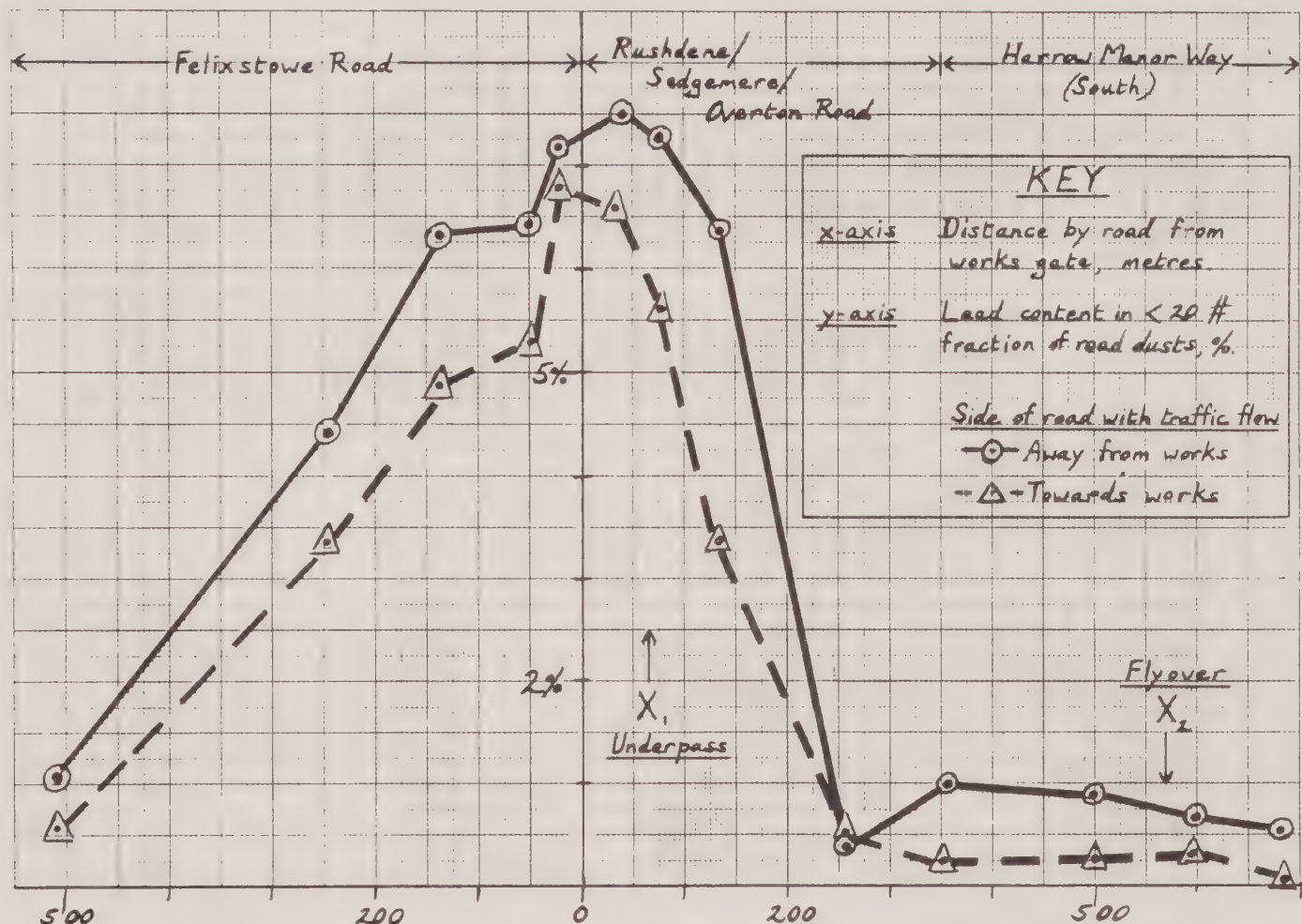


Fig. 5 Lead in road dusts — Abbey Wood, L.B. of Greenwich

Finally, Dr Turner was asked about the standardisation of sampling techniques and methods and whether there was any possibility of a standard sampler being accepted in the near future. Different surveys undertaken by Warren Spring Laboratory using different sampling apparatus had given slightly different results for what was effectively the same lead concentration at the same site. Dr Turner conceded the point but said that the multi-element Extended National survey sampler had been checked against the Midlands Metals type with comparable results for lead. The 5-towns sampler was of much older design and had been adopted because of the need for a much more vandal-proof construction for use at the kerb-side, and to follow diurnal traffic variations by taking 3-hour means; this had resulted in a sampler now known to read low and this fact was fully appreciated in interpretation of data.

In order to implement any future EEC legislation on airborne lead levels, it would

obviously be necessary to specify a sampler; if the appropriate ISO committee now considering the matter could not agree then the EEC itself would have to specify a design.

The afternoon session at the seminar was devoted to discussion of the redevelopment of contaminated land, with a talk given by **Mr M A Smith** of the **Department of the Environment, Central Directorate on Environmental Pollution**. Mr Smith was accompanied by his colleague, **Mr M Beckett**. Mr Smith introduced his talk by saying that an increasing proportion of development land was contaminated. He was addressing himself largely to a local authority audience, and local authorities were closely involved in a number of ways with the use of such land. The Department of the Environment had produced guidelines which could be used by local authorities and DOE could also offer other practical help.

Mr Smith defined contaminated land as land in which substances are present, which if present in sufficient amounts, are likely to become hazardous to man or to other forms of life. The redevelopment of contaminated land covered a wide variety of applications, including change of use. Contamination of land was mainly due to industrial activity or to the disposal of waste. However, airborne contaminants from, say, smelters, could affect adjacent areas and even the burning of coal on domestic fires appeared to have contributed significantly to the heavy metals content of gardens.

Contamination could be classified in terms of hazards and targets. Hazards were physical; inhalation or direct ingestion, indirect ingestion and contact, and were either short-term or long-term. The long-term hazards (carcinogens, cumulative poisons and some skin effects) were more difficult to assess.

Government policy is that contaminated land should be maintained or brought back into use with full protection for the population and other forms of life, but that there should not be undue over-reaction to the possibility of contaminants. This policy was in line with a variety of government policies on the reclamation of derelict land and the regeneration of industry, conservation of good agricultural land and the preservation of the environment.

Turning to the procedure for dealing with contaminated land sites, Mr Smith said that there were three principal things to identify, the first being the type of hazards, and the targets which might be at risk from the hazards, e.g. man, water supplies etc., the second being any potential 'problems', taking the intended land use into account, and the third being appropriate remedial action(s). Each site obviously had to be treated on its merits but, particularly with long-term hazards, general national guidance was necessary. This framework of national guidance had to be flexible and had to allow for commonsense application. The list of possible contaminants was endless so the intention was to provide for the most common, such as lead, zinc and cadmium. Obviously, particular hazards were of greater or lesser importance, depending on the land use and target. DOE's approach was to define acceptable levels and work from that basis, up to an unacceptable level, with a grey area in between. It was felt that this provided for a more flexible approach than working from a defined upper limit, or unacceptable level.

There were several reservations to be borne in mind when any particular site was being considered: the first being the variability in natural background levels of contaminants; the second, that existing developments might be on contaminated land not previously identified as such, and the third was that any specific numbers or guidelines might at a

later date be framed within mandatory legislation from within the UK which would lead to lack of flexibility in application. These reservations had been expressed by a number of people in response to the previous DOE consultation paper; Mr Smith said that this paper was being revised to take account of comments received, and the revised document would shortly be issued for comment.

Dr Smith stressed that foresight and planning were very important when redeveloping contaminated land. Failure to recognise contamination early would almost certainly result in financial loss. Under a new Bill, the Derelict Land Grant would be payable whether or not, after assessment, the scheme went through, and would also be payable on land that might be available for housing, again whether or not the scheme went through. Much research could be done beforehand by examining old records of land use, plans etc, in a "prospective survey". Above all, a multi-disciplinary approach was essential.

Turning to the survey of contaminated land, Mr Smith said that the site investigations he had examined rarely met the criteria for data set out in the consultation paper. Data was often inadequate because of the high cost of the survey compared with the value of the development and also because of variability in the quality of chemical analysis. Obviously, there had to be a number of samples taken over the site to give a true picture of contamination in different areas and it was better to take a large number of samples at the outset, rather than to re-survey at a later date when inconsistencies in results had shown up. DOE/CDEP were involved in some 200 sites throughout the UK. They had produced guidance notes on particular problems which were freely available (such as that for gaswork sites). They were willing to make site visits, and identify possible pollutants and help to assess data and select appropriate remedial action. CDEP could also assist by explaining to DOE housing directorates, the essential nature of, sometimes expensive, remedial measures. They sometimes talked to private developers, trying at the same time to involve the local authority concerned. This DOE involvement in individual cases was not only beneficial to the developers or the authority concerned, but helped the Department to formulate better guidelines for the future.

Talking about remedial measures, Mr Smith said that the first was for the prospective owner or developer to decide beforehand whether or not to buy the site or develop as planned. Remedial action had to follow two basic principles. The first was that it should be durable, *i.e.* it should continue to serve the purpose for the required length of time, and the second, that it should be robust, *i.e.* resistant to normal building processes, bad workmanship, change of land use, etc. Often there was no permanent guarantee of effectiveness so interim monitoring should be carried out and a check kept generally on the suitability of the site for the purpose. It should not be "out of sight, out of mind". Interim remedial solutions were various and ranged from digging up or covering up the land to re-zoning the end use of the land (this option was obvious but not always possible on economic grounds or because of lack of alternative space for a particular project).

During the discussion, **Councillor T Short of Nuneaton D.C.** said that the Crown Agents were one of the worst polluters in the country. **Mr Smith** agreed that the Woolwich Arsenal, for example, had been sold as a clean site when it should not have been so described but he explained that the Property Services Agency is now involved in the Committee dealing with the redevelopment of contaminated land and that wherever PSA were concerned, they would certainly try to take a responsible and open approach to potential problems.

Mr Taylor of **Sandwell M.B.C.** raised the question of reclamation of land which had previously been used as a land-fill site for domestic refuse. Methane was often a problem in such cases. **Mr Smith** explained that the Interdepartmental Committee on the Redevelopment of Contaminated Land had drawn up some notes on land-fill sites which had dealt with this question. The dangers from methane and carbon dioxide rising from the decay of refuse were well established and there had been many incidents of fires, explosions and gas accumulations which had, in a number of cases, resulted in loss of life. Where the sites were being used for industrial purposes, methane was easier to deal with. There were three principles; the first was to keep the gas out of buildings; the second was to control the gas wherever it came up on site by drainage and the third was to cope with the possibility of gas entering the building, in spite of precautions, by monitoring or ventilation.

Mr Taylor then asked what was the appropriate number of samples per hectare for the initial survey. **Mr Smith** said that a number of samples were necessary but that the specific number depended upon the site and the probable nature of the contaminants. A typical minimum number to feature the site was about 10-15 samples; with a bigger site, more were obviously necessary. There would probably be a variation of contamination across the site on a fairly small scale so that there might be a need for very close sampling in some areas, using a grid system.

Mr Smith was also asked about the variation in sampling techniques and whether there was any quality control on the analysis of samples. He replied that analysts should, in any event, carry out internal quality control checks but it was very helpful if the analyst knew what the samples were and the significance of the results and was carefully informed about sample preparation. He thought that it might be necessary in the future to move to some standardised method of sample analysis. The United States has an elaborate protocol including a requirement for quality control checks.

Dr McCulloch of **Birmingham City Council** agreed that the answer to the problem of quality control lay in close co-operation with those doing the analysis. He further suggested that the background levels, even where these were high, provided an indication of acceptable levels, particularly where the population had been exposed to them for a length of time with no adverse effect. He suggested that any contamination above that level should be regarded as unacceptable. Work could then proceed on tying-in toxicity levels in plants, and health effects on humans, with contaminant levels found. **Mr Smith** agreed that background levels were subject to variability but said that human response to levels was also variable.

Mr Treadwell of **Hereford and Worcester County Council** said that there were basically two types of route to human target for which guidelines might be needed. The first was the indirect route, i.e. human uptake from plants (and he noted that the uptake by plants depended on the soil type), but the second route was the direct one of pica in children. **Mr Smith** said that it was not feasible to legislate for the pica child, but standards should protect the ordinary child playing in the garden, sucking dust-covered sweets, etc. Contamination of water supplies, where pipes passed through contaminated land, needed more work so that appropriate standards could be set.

Finally, **Mr Blakey** of **South Staffordshire D.C.** referred to the spreading of sewage sludge on agricultural land by water authorities. He was concerned that this was still going on and that water authorities appeared to be disregarding guidelines. Sewage sludge had

been shown to have a high heavy metals content and he felt it was time that the heavy metals were extracted from the sludge altogether, before spreading. **Mr Smith** explained that the National Water Council, in collaboration with DOE, had in 1977 produced guidelines on the use of sewage sludge on agricultural land, which took into account the effects over a thirty-year period. This therefore allowed for reassessment during that time, and indeed a revised set of guidelines were in the pipeline. In general terms, the metals content of sewage sludge was coming down. An alternative to widespread agricultural use, which might raise metal levels on a significant proportion of agricultural land, was to deposit the sewage sludge on 'sacrificial' land, i.e. the traditional sewage farms.

The proceedings ended with a vote of thanks from **Dr D Evans, Director of Environmental Health Services, Coventry City Council**, to all those who had helped to make the seminar such a successful event. He paid tribute to the chairmanship of Councillor Randall, to the organisation by Mr Brookfield, and above all to the two speakers for their most interesting presentations.

DIVISIONAL NEWS

NORTHERN DIVISION

The Spring meeting of the Division was held in the Civic Centre at Sunderland on 26th March, 1980. Unfortunately the attendance was reduced due to industrial action, but the 32 members who turned up were well rewarded with a lively and interesting meeting.

After a welcome by Councillor S. Furness, a member of Sunderland Environmental Health Committee, the meeting was brought up to date with what had been happening at Headquarters and in the various Committees. This provoked a discussion on the apparently high handed way in which the Secretary of State had decided that the Clean Air Council should no longer exist. Members thought that as the Council had been brought into existence by the Clean Air Act 1956, any decision to wind it up should be taken by Parliament and not arbitrarily by the Minister.

The main business of the afternoon was a talk by Mr. F.M. Johnson, Regional Planning Officer to the Northern Region of the National Coal Board, on the history and current situation regarding opencast mining with particular reference to the North East. Mr. Johnson explained how obtaining coal by these means started in a very small way in 1942 under the Defence of the Realm Act and had gradually expanded until in 1979 13.8 million tonnes had been obtained from opencast workings. The North East was one of the regions involved in opencast mining from the outset and coal was now being obtained by these means in every county of the region other than Cleveland.

Mr. Johnson detailed the procedures adopted from the initial prospecting of an area which indicated the type and quality of coal available, depth and thickness of seams, amount of overburden, etc., through the various stages of consultation and enquiries before a final authorisation to proceed is received from the Secretary of State for Energy. This often takes up to 9 years to complete before any coal is produced. Normally coal within 300 ft. of the surface is deemed to be obtainable, the ratio of overburden to coal that is acceptable for profitability varying from 20 : 1 for bituminous coal to 30 : 1 for

anthracite. The Coal Board do not carry out opencast mining themselves, but once an authorisation for mining in an area is received, tenders are invited from private contractors and the successful firm proceed to mine the coal in accordance with the conditions specified in the authorisation. Surveys on countless sites have shown that the bulk of the labour force on any opencast site lived locally so that the Board provided much needed local employment for men to work under infinitely better conditions than found in the older collieries.

Before answering questions Mr. Johnson proceeded by showing a film of the Butterwell opencast operations. This operation covers a 2,000 acre site in Northumberland near Morpeth, employs over 500 men and will eventually produce 14 million tonnes of good quality coal.

In the discussion period that followed there was nothing but praise for the Board and the ends to which they are prepared to go in reinstating the land after work has ceased. Most difficulties appear to arise in getting planners, farmers, environmentalists and all other interested groups and bodies to agree on what they would like, e.g. hedges, trees, etc. Mr. Johnson drew attention to the much higher number of applications which now go to public enquiry compared to 20 years ago and speculated on the reasons for this. Finally he and his colleague, Mr. Harkness, Environmental Engineer, were thanked by the Chairman of the meeting, Mr. L. Mair.

C.R. Cresswell
Hon. Secretary

SOFTLY SOFTLY ON VEHICLE NOISE?

Marcus Fox, Parliamentary Under Secretary of State, Department of the Environment, has pledged UK support for continued efforts in international fora to agree tighter noise limits for motor vehicles and aircraft. Speaking at the international OECD conference on anti-noise measures held in Paris, 7 – 9 May, Mr. Fox said that the work of central Government was to give local authorities a framework of legal powers to tackle noise nuisances. He continued:

“Government must set some national standards for things like motor vehicles, which no local authority by itself can set. In this we must move in step with our economic partners.”

In the light of Mr. Fox's remarks it would be surprising if the Department of Transport were now overcautious about implementing the 1977 EEC Directive on vehicle noise. This proposes an 80 dB(A) limit for all categories of vehicle by 1985.

Noxious or Offensive Gases *(continued from page 86)*

The wisdom of including “hydrocarbons” and “carbon dioxide” in the list of noxious and offensive gases is questioned. “Hydrocarbons” is a blanket term covering a huge variety of substances, not all of which are harmful. Emissions from stationary sources are small in relation to those from vehicles, solvent evaporation and industrial processes.

Whilst it is recognised that carbon dioxide emissions from certain chemical processes (e.g. some ammonia works) can be highly concentrated and require special attention, CO₂ is not generally regarded as being noxious or offensive. It is suggested that the reasons for including it should be made clear.



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INTERNATIONAL NEWS

an IUAPPA publication

GREECE

The Hellenic Association on Environmental Pollution has joined IUAPPA as an Observer Member. The Hellenic Association (E.R.Y.E.A.) has its offices in Athens: 14 Xenofontas Street, Athens 118, Greece; tel. 32.43.534/32.45.747. The Director of the Secretariat is Dr. A. Mavromatis.

The goals of the Hellenic Association on Environmental Pollution are as follows:

1. Contribution to the study of problems related to the research and control of water, air, soil and noise pollution, as well as to the appropriate measures which must be taken for controlling pollution.
2. Creating a public consciousness for the necessity of taking all necessary measures to prevent and control water, air, soil, and noise pollution.
3. Following up scientific research in the field of environmental pollution control.
4. Support and promotion of special scientific studies or surveys, elaboration of appropriate institutional and administrative measures related to environmental pollution control subjects, as well as encouragement of young engineers and scientists on the above subjects.
5. Co-operation with Greek Organisations and Governmental or Municipal Services working on subjects related to environmental pollution control.
6. Co-operation with similar foreign organisations for the promotion of the above mentioned subjects and the exchange of ideas and experience.

AUSTRALIA

7th International Clean Air Conference

CASANZ will hold the 7th International Clean Air Conference in Adelaide, capital of South Australia on August 24 – 28, 1981.

Conference topics have been arranged under three broad headings:

Social: including socioeconomic and health aspects of air pollution, legislation, and air quality objectives;

Control: including control technology and developments in the control of stationary and mobile sources, energy aspects and economics;

Assessment and Prediction: covering measurement, assessment and analysis of air pollution, procedures, instruments, and meteorology.

QUANTAS and TAA have been appointed Official Airline to the Conference.

Further details from: The Clean Air Society, S.A. Branch, GPO Box 1902, Adelaide, S.A. 5001, Australia.

Reader Enquiry Service No. **8032**

CANADA PRESSES U.S. TO CUT ACID RAIN EMISSIONS

Canadian officials have urged the U.S. Government to build sophisticated pollution control technology into its proposed coal conversion program for oil-fired electric power plants in order to reduce emissions of acid-causing pollutants.

FRANCE

APPA held a two day scientific meeting in Paris, December 6th and 7th, 1979. The theme was 'The Automobile — Economics of Energy and Atmospheric Pollution'. The meeting took place under the auspices of the Ministers of the Environment and Quality of Life, of Public Health, of Industry, and of Transport. The event was a great success; more than 200 delegates attended, among them scientists, doctors, biologists, physicists and chemists, with representatives from motor manufacturers and the Institute of Transport Research.

Many papers were presented, dealing in particular with the physical chemistry of pollutants from automobiles, the analysis of pollutants, the biological action of pollutants and their effects on vegetation, the problems of lead, carburettor improvements carried out by different motor manufacturers, catalysts, diesel engines, vehicles powered by LPG and electric vehicles. These papers gave rise to much interesting discussion.

Air Quality Agency

During their meeting of 18 December 1979, the National Assembly discussed a proposed Bill for the establishment of an agency for the atmosphere. During the exchange of views, M. Delmas, Secretary of State for the Environment, recalled that SO₂ pollution from stationary combustion sources had decreased by more than 25% between 1971 and 1977, as had pollution from black smoke, CO levels had decreased by 50% between 1973 and 1976, while dust emissions from stationary sources was reduced threefold between 1970 and 1980.

After amendments, the following Bill was adopted:

"An Agency for the Quality of the Air is hereby created, as a public body with an industrial/commercial character, charged with promoting and carrying out action for the measurement and prevention of atmospheric pollution; and with providing information on the subject. The Agency can carry out research, studies and work related to its object or can give assistance to such research".

One third of the members of the Administrative Council of the Agency will be composed of government representatives, one third will be suitably qualified individuals, and one third will be representatives of local government and local interest groups and associations.

OBITUARY

DR ALBERT PARKER, CBE, DSC, FRIC, FIChemE, FIGasE

Dr Albert Parker, who died on April 1st 1980, aged 87, was a Vice President of the Society and a former President. For many years he was a Member of the Society's Technical Committee, and was always deeply interested in the Society's aims and work.

Dr Parker's long and distinguished career began in 1912 when, after graduating from Manchester University, he became Research Fellow until his appointment as Lecturer at Birmingham University in 1914, which post he held until 1919. During the First World War he was Inspector of Production of High Explosives. From 1919 to 1928, he was Head of Research, Institution of Gas Engineers, and from 1928 to 1943 he was Assistant Director and then Director, Water Pollution Research DSIR. In 1943 he was appointed Director of the Government's Fuel and Air Pollution Research Establishment, and he held this post until his retirement in 1956. He was an Assessor to the Beaver Committee whose reports in 1953 and 1954 led to the 1956 Clean Air Act. From 1956 until his death, Dr Parker worked as an independent Chemical Engineering Consultant, and in this capacity he travelled in many different countries.

Dr Parker was a prolific author with hundreds of articles published in books, journals and encyclopaedia. For many years he prepared the 'Estimates of Air Pollution in the United Kingdom', which were published in 'Clean Air' and the NSCA Year Books. His most recent work was to edit the Industrial Air Pollution Handbook, for which he also provided material based on his vast fund of knowledge and experience.

We recall with gratitude and affection Dr Parker's wise counsel and his many years of service on the Society's behalf. His presidency from 1963 to 1965 enhanced the Society's work and prestige and the benefit of his interest in the Society's affairs continued. In 1973 the Society was delighted to bestow upon Dr Parker the "Arnold Marsh Clean Air Award", an award made to individuals and organisations that had rendered outstanding service to the cause of Clean Air.

Dr S R Craxford writes:

In the mid 1940s a rearrangement of staff at the Fuel Research Station brought me directly under Dr Parker and he set to work with infinite patience, and considerable firmness, to teach me my trade — the science and technology of air pollution and the arts and crafts of administration. Whatever problem he was concerned with, his insistence on searching out all the evidence, evaluating each bit critically and reporting the conclusions dispassionately and unambiguously put me back into the world of careful scholarship I had left at Oxford some ten years before. This scrupulous honesty and fairness with facts applied equally to his dealings with people, even down to the most trivial matters such as giving full public acknowledgement to anyone who might have helped him in gathering material for a lecture. The other side of the coin was that he did not tolerate fools very gladly, and his large repertoire of anecdotes basically centred around his war on rogues and their roguery.

There were other sides to Albert Parker. He had an exceptionally keen ear for music and was a good pianist. He was a kind man even when an act of kindness involved him in considerable trouble. He was immensely proud of the career of his eldest daughter (she is now a Q.C.) and was never happier than when staying with her and her husband and family in their country house — the cottage — at Rushden where latterly he had settled comfortably into the life of the village. In this age of what one might call mechanized illness and death his friends were very glad that he was able to die peaceably in his own home at Northwood, where he had lived for much of his life, and be buried with his wife, whom we all loved dearly, in the village churchyard on the downs at Rushden.

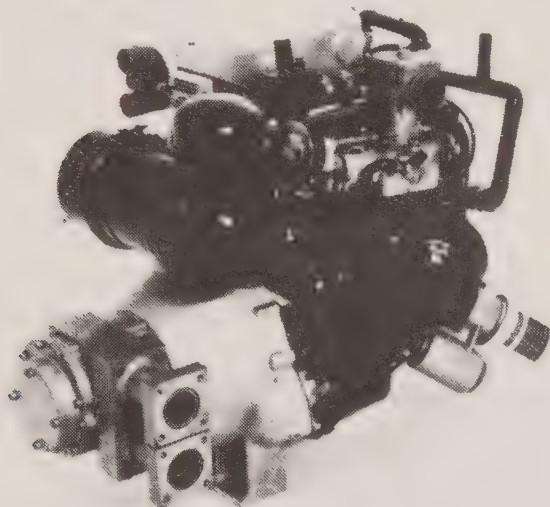
INDUSTRIAL NEWS

Ford Heat Pump Engines

Producers of specialised plant have proved that the Ford gas fuelled 2274E engine is just the job for driving such self-contained units as standby generators and air conditioning and refrigeration equipment.

This quiet and compact power source has major advantages over the traditional electric motor, including lower operating costs and greater convenience as Natural Gas can be 'piped in' in the same way as for a domestic appliance.

Gas fuelled engines also have a longer life compared with their petrol equivalents. There is less oil contamination and less wear on moving parts.



The range of applications for these thrifty, high performance Ford engines is widening to take in a variety of heat pumps and waste heat recovery systems, some of which even 'reclaim' the heat from bath water, toilets, washing machines and industrial processes.

Several manufacturers have already started to offer gas fuelled heat pumps ready to plug into household gas supplies. According to Peter Johnson, Manager for Ford industrial engine sales throughout Europe, "This is the start of a new era in energy saving techniques that may revolutionise the market for small industrial engines, and help to conserve fuel for future generations."

Reader Enquiry Service No. 8033

Plastic Constructions Eliminate Fish-Meal Odours

Production of high quality fish diets involves blending and processing a variety of ingredients. It is a complicated process and, like many similar projects, produces unpleasant odours. When such a process is adjacent to residential housing, steps must be taken to reduce these odours below the threshold of smell.

One manufacturer with just such a problem was BP Nutrition (UK) Limited of Longridge near Preston, Lancs. Tight production control over the processes in the making of high quality salmon and trout dishes was practised but the problem remained. The answer was to identify the concentrations of the offensive chemicals and to neutralise their effects.

To do this without interrupting production was difficult but the problem was resolved by calling in Plastic Constructions Ltd. Tests were carried out on a 10% sample of the actual production emissions using a pilot plant developed precisely for such investigations. This mobile unit takes a known throughput and treats it on a sampling basis, enabling precise determinations to be made of the total plant requirement. Based on the results of the tests, which received the approval of the local Ribble Valley Environmental Health Authority, a scheme was devised and a full scale plant ordered.

The scrubbing equipment utilised was a two-stage size 9 Placon K type NAV unit, using two different reagents and having a high efficiency moisture eliminator between the two scrubbing stages. Each stage has three banks of sprays and special design features prevent the mixing of reagents.

The process gases, most of which came from the pelletizer, were mainly tri-ethyl amines, ammonia and some hydrogen sulphide. Designed for a throughput of 8,000 ft³/min (13,600 m³/hr) the scrubbing unit uses a weak sulphuric acid solution

as the reagent for the first stage with caustic soda for the second. No traces of the offending gases are present after treatment, i.e. at the scrubber outlet.

The scrubber stands some 29ft high and has a diameter of 8ft (2400 mm). Solids are removed from the gases by a cyclone at the pre-scrubbing stage. The odour-laden air then enters the scrubber at the bottom, passing through the first washing stage and upwards over and through the intermediate moisture eliminator. It then continues its upward flow through a further three banks of sprays which constitute the second washing stage and is exhausted to atmosphere from the top. Conical deflectors above the moisture eliminator prevent any fluid from the second stage draining back to the eliminators and contaminating the first reagent stream.

A tank is built into the base of the scrubber to hold the weak acid solution and a separate plastic tank provided for the caustic soda solution.

Initial tests on the mobile pilot plant took only three weeks during which the most efficient scrubbing reagents and minimum plant size were precisely determined, with no disturbance to normal production. The installation has resulted in the cessation of complaints from local residents.

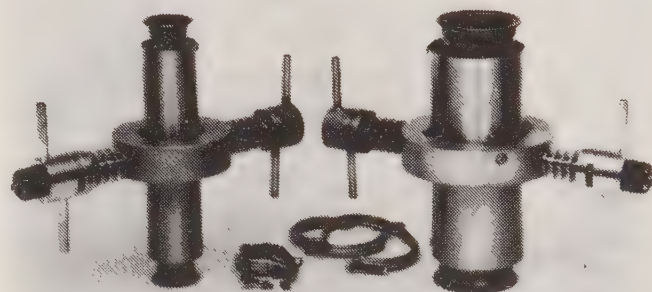
Reader Enquiry Service No. 8034

New Diesel Smoke Meters

Telonic Berkeley now distributes two new diesel smoke meters in the UK for testing smoke emissions from light duty diesel engines. These 2 inch and 4 inch units are versions of the Berkeley model 107 6 inch smoke meter introduced to the British market in 1978.

The two smaller diameter smoke meters were produced to meet requirements for smoke emission testing of the increasing number of small diesel engines used in cars, and farm and construction equipment. The 2 inch meter can be used for testing single and twin cylinder diesels.

The new 2 inch and 4 inch meters can measure smoke in the exhaust pipe down to 1% opacity and with virtually no zero drift. They read either opacity or smoke density on a digital display (opacity to 0.1%, K to 0.01%) and are fast enough to read the smoke output of each cylinder for diagnostic work.



The main operating principles of the meters are highly collimated pulses of green light emitted by a long-life Light Emitting Diode. This light which is unaffected by ambient light changes, is read by a silicon photodetector. Two Integrated Circuit times, with patented circuits, open the detector gate only to look at the stabilised section of each pulse, resulting in a deviation from linearity of less than 0.1%.

The Berkeley 4 inch meter is priced at £3,485, excluding VAT, and the 2 inch at £3,629, excluding VAT.

Reader Enquiry Service No. 8035

A New Bridge over Troubled Water?

European Directories have just published a new Directory of Pollution Control Equipment Companies in Western Europe.

It is 5 years now since the first such directory, published by Graham & Trotman Ltd, identified this growth industry, worth well over £1 billion a year. The production of equipment on a large scale for the analysis and measurement, control and treatment of specific pollutants has developed enormously since then. European Directories have re-researched old material, and extended the scope of the original directory to provide an exhaustive new pan-European

survey of the field.

The directory brings together information on 6000 individual EEC Pollution Control Equipment Companies, giving names, addresses and telephone numbers of the firms, and descriptions of their products and services. A detailed index containing 52 headings indicates the various pollution control techniques, processes and types of equipment, and may suggest solutions to particular pollution problems. The index is broken down further into individual countries, and is designed for access to the maximum of information in the minimum time.

As well as providing planners in the anti-pollution products companies with an invaluable overview of the industry, the book will aid their assessment of competition, ease communication with colleagues and agents, and offer ideas for market development.

The directory will be of equal value to those companies facing pollution difficulties, since it will cut research time and costs in identifying supplies and products. The potential customer is provided with numerous alternative sources of equipment and services, in the UK and in other European countries.

The Directory of Pollution Control Equipment Companies in Western Europe is published by ICC European Directories, 23 City Road, London EC1Y 1BD, Price U.K. £25.00, Europe: £27.00, Rest of the World: £29.00.

Reader Enquiry Service No. 8036

Perkins Can Tell Its Customers How to Keep Quiet

The Perkins Engines Group has set up a new Applications Noise Advisory Service to help manufacturing customers who instal the Group's diesel engines cut down on the overall noise generated by their finished products — whether they are vehicles, fork lift trucks, tractors, diggers, generator sets or boats.

Perkins application engineers have always

been available to advise customers on noise abatement, but with the increased knowledge gathered from ten or more years of intensive noise research, the service has now been formalised.

The Perkins Noise Advisory Service includes three highly specialised engineers who, in effect, front the large research team that operates out of the Group's multi-million pound UK-based research and development facility. This facility includes three specially designed anechoic chambers — or 'noise cells' — which are among the most advanced of their kind in the world. In-depth studies are carried out to identify specific engine and installation noise sources and once these are identified, Perkins researchers determine ways of treating them.

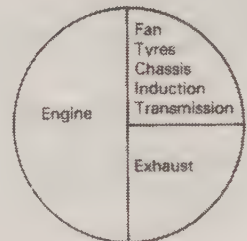
DIESEL-POWERED EQUIPMENT

RELATIVE CONTRIBUTIONS OF NOISE SOURCES

Medium range truck



Moving test procedure
— noise measured
at side of vehicle



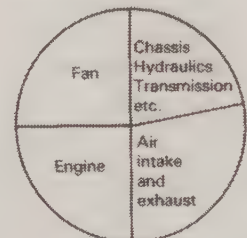
Wheeled shovel loader



Stationary test: noise
measured at
rear of machine



Stationary test: noise
measured at
operator's ear



The Service is at its most effective when giving assistance at the design and development stages of a product, but advice can also be given to a manufacturer who wants to reduce the noise of an existing product so he can sell it into one of the world's more

noise conscious areas.

Most enquiries can be dealt with by correspondence but, in a serious problem situation, a member of the team will fly to a customer anywhere in the world.

John Lawrence, Perkins Director Operations Engineering with overall responsibility for the Noise Advisory Service explained that it must, for obvious reasons of cost, be restricted to Perkins direct manufacturing customers: "We just could not cope with requests from operators to treat individual machines" he said.

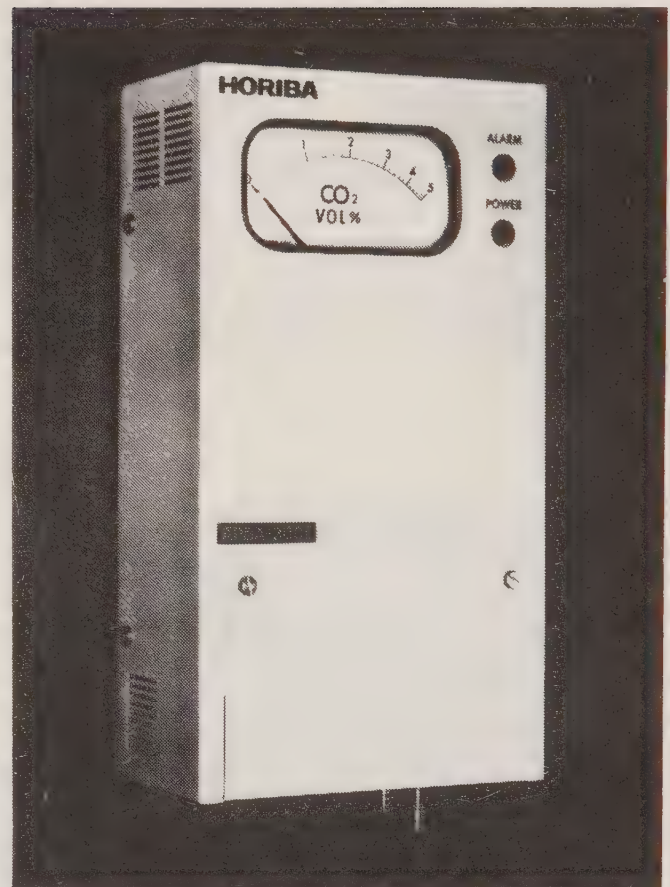
Reader Enquiry Service No. 8037

New Carbon Dioxide Monitor Slashes Fuel Bills

Field trials recently carried out in Japan indicate that central heating fuel bills can be reduced by as much as 60% by linking Horiba's new carbon dioxide monitor to the air conditioning system in offices, theatres, cinemas, conference centres, and other large buildings. Designated APBA 200, the equipment is now available in the UK through Horiba Instruments Ltd, Northampton.

The principle of operation involves presetting the monitor to the recommended maximum carbon dioxide level, typically 1000 parts per million. Warm air is then recirculated within the building until this safe CO₂ limit is reached, whereupon the monitor automatically trims the ventilation control damper to maintain this level, thus maintaining cold air intake. A considerable reduction in wasted heat is therefore achieved compared with conventional manual trimming.

APBA 200E is suitable also for use in isolation for measuring CO₂ concentrations in the range 0-2000 ppm (optionally 0-5% vol.), values being read from an analogue meter on the front of the instrument. Other external features are an alarm light which triggers when a predetermined level is reached, a 'mains-on' neon, and sample ports through which the built-in pump draws air around the system.



The new, low-cost monitor employs the very accurate (and normally expensive) non-dispersive infrared analysis principle for determining CO₂ concentration. Repeatability is $\pm 1\%$ of full scale deflection. Reader Enquiry Service No. 8038

The Hartridge 'Injectacentre'

The rapid expansion of diesel engine utilization, added to the current emphasis on fuel economy and smoke, have together created a growing demand for first line diesel injector test and servicing facilities. Leslie Hartridge Limited, the diesel test equipment specialists, in recognising this need, realise that many workshops may find it difficult to provide the essential clean working area for injector servicing. The result is the 'Injectacentre', a new Hartridge product which is an injector test and service unit completely self contained and providing the required clean, and secure working area.

The Injectacentre cabinet is divided into

two, the upper section being fitted out as a working area, where equipment has been carefully sited and racks provided for the tools and accessories. Everything is to-hand ready for use. Lockable steel doors give more than adequate access for working, but maintain security and cleanliness when the cabinet is not in use. The lower section of the cabinet provides additional lockable storage space.



Service equipment contained in the cabinet comprises: an injector tester complete with filtered oil supply and fume extractor, a dismantling jig, lapping plate and washing tank together with a range of the special purpose service tools and accessories that will enable the Injectacentre to handle most commonly available injectors. Illumination is provided by a built-in lighting system and, for detailed inspection work, a magnifying glass and probelight are provided. All fumes from the injector tester are collected by an air driven extractor and can be vented via a connection at the rear of the unit.

Reader Enquiry Service No. 8039



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Reader Enquiry Service No. 8040



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CLEAN AIR

VOL.10 NO.4





Caring for the environment



The Central Electricity Generating Board has received more than 40 Commendations and Awards for environmental schemes at power stations, substations and associated nature trails and field study centres in England and Wales.

They include the Arnold Marsh Clean Air Award, two Prince of Wales Awards, four from the Business and Industry Panel for the Environment, six RICS/Times Conservation Awards and nine Wales in Bloom Awards.

Central Electricity Generating Board

CLEAN AIR

THE JOURNAL OF THE NATIONAL SOCIETY FOR CLEAN AIR

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The Society held a special meeting at the Guildhall on June 12th, with the purpose of giving members the opportunity to discuss the findings and recommendations of the Lawther Report on Lead and Health. Pat Lawther addressed the meeting and presented an overview of the report and of his own studies of lead as an air pollutant. The discussion was lively, with contributions from individual members, representatives of local authorities, industry, and learned bodies, and it is hoped that the meeting will set the pattern for future Society debates on important issues. (For full report, see pages 111-123.) Meanwhile, the Society's new publication, "Pollution from Road Vehicles" is now being printed and will be presented at the Bournemouth Conference in September (on Wednesday afternoon, September 24th). The booklet is the result of years of hard work by a small editorial sub-committee of the Society's Technical Committee, and the publication will be on sale to members at the price of £2.85 inclusive of post and packing.

For those who have not yet registered for the Bournemouth Conference, we would like to remind you that members of the Society may attend individual sessions at a special rate, and may of course register for the whole event at a reduced rate. The Conference programme this year is extremely interesting and varied, with a whole day devoted to the subject of Energy and the Environment, and, sessions on Noise, Pollution from Road Vehicles, Smoke Control and an Open Session when members of the audience can put questions on a whole variety of topics to a Panel of Experts. While the programme is packed, the Society always allows ample opportunity for discussion at each session, and the high standard of the papers to be presented, the range of topics to be covered, and the relatively low registration fee all make this a conference not to be missed by anyone with a serious interest in the control of air pollution and noise. Delegates will hear, straight from the horse's mouth, what the energy industry sees as its priorities for supply and environmental protection now and in the future, and also what DOE's plans are for the implementation of the EEC Directive on Smoke and SO₂ (the first time this will have been explained in detail). Don't miss it!

The Department of the Environment recently issued their report on Air Pollution in the Bedfordshire Brickfields, the result of interdepartmental review of the effects of air pollution from the Fletton Brickworks in the Bedfordshire area. The report concluded that on the evidence available, major pollutants emitted by the brickworks (fluoride, sulphur dioxide and odours) are not harmful to human health in the concentrations found locally. It suggested that priority should be given to solving the problems of odour, that further measurements of airborne fluoride levels should be undertaken and that research into the effects of sulphur compounds and fluorides should be continued to determine whether there could be effects on animals and crops. The London Brick Company, Britain's largest brick producer, have been operating in the Bedfordshire area for more than 80 years, and recently applied for planning permission for two new brickworks at Stewartby and Ridgmont in Bedfordshire which would mean the eventual replacement of 98 chimneys in the Marston Vale by four very much higher stacks. The DoE report says that the effect of these would be to reduce the maximum ground level concentrations of pollutants by 90% and secure a considerable improvement in the incidence of odour. However, Bedfordshire County Council have insisted that LBC take steps to eradicate emissions of sulphur dioxide, fluorides and the odour; otherwise planning permission will be refused. Residents in the area have had to live with the problems of odour, in particular, for years, and while LBC is a major employer in the district, there is a strong feeling locally that the proposed new developments present the opportunity for real action to control an all too familiar nuisance.

LEAD IN THE ENVIRONMENT

Report of a special NSCA meeting by **Jane Dunmore**

On Thursday June 12, the National Society of Clean Air (NSCA) held a meeting at the Livery Hall, Guildhall, London, to discuss the recommendations of the DHSS Working Party on Lead and Health. **Professor P.J. Lawther**, who chaired the Working Party, presented the salient features of the report and he and some of his colleagues discussed with the audience the report's implications. Professor Lawther is well known to members of the Society as a former President and now Honorary Vice President. He is Professor of Environmental and Preventive Medicine, University of London, at St. Bartholomew's Hospital Medical College and the London Hospital Medical College, and acts as Consultant Adviser to the Department of Health and Social Security.

Introducing the meeting the Chairman, **Rear Admiral P.G. Sharp**, Secretary General NSCA, said that lead was an emotive metal and an emotive subject. He reminded the audience of the many sources of lead in the environment, all of which had been considered by the Working Party. Admiral Sharp pointed out that it was widely and sometimes erroneously believed that all lead in air was due to the addition of lead in petrol. As a result of this belief and of representations made to the Government, it was decided to hold levels of lead in air to the 1971 level and there have since been progressive reductions in the lead content of petrol. The Government also appointed a Working Party to review the whole question of environmental lead and health, particularly the health and development of children, and to assess the contribution of lead from petrol engine exhaust. The Working Party reported in March 1980, and the report, 'Lead and Health', is available from HMSO at £4.50.

Professor Lawther's talk dealt not only with the DHSS report and the Working Party's recommendations, but also with his own background of work on lead. He and his colleagues have been studying air pollutants for some thirty years and they were originally interested in lead as an accompaniment to other pollutants such as carbon monoxide, oxides of nitrogen, olefins and polyaromatic hydrocarbons. It was clear that, while his work had stimulated his interest in lead as an air pollutant, he had always accepted that lead in any form was highly undesirable.

When concern was voiced in the House of Commons that the amount of lead in air was increasing, Professor Lawther and his colleague Mr. Waller (also present at the meeting) were asked whether lead levels had risen in Fleet Street, London, in particular. They had been studying air pollution in that street and made calculations based on their results over the years which revealed that lead levels at one particular site had risen, but due rather to an alteration in the mode of traffic than to any increased congestion. Generally, results showed a steady, even downward trend, consistent with reductions in the lead content of petrol. Despite the increased use of petrol in terms of bulk, voidage of lead to air had been fairly constant.

Professor Lawther also studied the actual particle size of lead emitted from motor

vehicles. It had been widely assumed, previous to his study, that the particle size of lead emitted by motor vehicles was .5 microns, and this had been the basis for calculations about the retention of lead in the human body, the rate of deposition, etc. However, the figure of .5 microns had not been based on visual evidence so Professor Lawther had taken a photograph to examine the actual particle size of lead emitted from a hot idling Morris 1000. Tested on a dynamometer under full load it was found that there was no particle remotely approaching .5 micron in size; the particles were all very small and all very complex, both physically and chemically. Samples of air were also taken from Fleet Street using a thermal precipitator and the results showed that some particles agglomerated to form complex aggregates with no specific particle size which therefore defied calculations as to their retention or site of deposition.

Over a period of many years, Professor Lawther and his colleagues took samples of their own blood lead levels, and results showed variations of between 6 and 24 $\mu\text{g}/\text{dl}$. Professor Lawther drew attention to the results of other blood lead sampling studies, e.g. that of children living in the Newham area, where blood lead levels were found to be reassuringly low. He said that the latest available results, from children in the Rochester Way area, showed an average reading, among 178 children in infant and junior schools, of about 12 $\mu\text{g}/\text{dl}$, despite a rather high mean ambient level of lead in air in the order of 2 $\mu\text{g}/\text{m}^3$.

Professor Lawther and Mr. Waller later examined their own results and calculations in the light of Dr. A.C. Chamberlain's 'alpha factor'. (This is basically a good working rule which states that if a person comes into equilibrium with an environment in which there is 1 $\mu\text{g}/\text{m}^3$ of lead and stays there indefinitely, he will add to his existing blood lead from other sources *about* 2 $\mu\text{g}/\text{dl}$.) In general terms, the results were consistent with this hypothesis, although Professor Lawther emphasised that the relationship assumed by the alpha factor must be curvilinear. However, he said that when a person has a constant dietary intake of lead, then, assuming a low level of lead in air initially, the percentage acquired from the air would go up as ambient air lead levels rose.

Professor Lawther said that the neat relationship between blood lead levels in the population and ambient air sample results in the inner and outer areas of Manchester and Leeds had surprised him. In the Three Cities and Seven Cities studies in the United States there was very little correlation between airborne and blood lead levels. Broadly, U.K. results matched Dr. Chamberlain's hypothesis that blood leads in the population in inner city areas are about 2 $\mu\text{g}/\text{dl}$ up on blood leads in the population living in outer or fringe city areas.

Referring to the DHSS report, Professor Lawther emphasised the importance of adventitious sources of lead in the environment. He and other members of the Working Party had been amazed at the number and variety of adventitious sources. He said that while motorways should not be ignored, any good physician would seek the adventitious source of lead if a child was presented with a blood level in the region of 35 $\mu\text{g}/\text{dl}$. In 99% of cases, the child would later be found to have the habit of pica, eating paint or chewing

toys with a lead based paint covering, or eating non-foodstuffs bearing lead in one form or another.

Among the many adventitious sources of lead mentioned in the report were lead primers, which by definition went into the depths of the woodwork so that scraping down and repainting the wood did not solve the problem; lead chromate in yellow lines on the roads; hair darkening tonics with a lead acetate base; lead batteries; and some Indian cosmetics and surmas.

The Working Party found no convincing evidence that levels of lead in blood lower than 35 $\mu\text{g}/\text{dl}$ have any adverse effects on children. However, Professor Lawther emphasised that adverse effects, including impairment of intelligence, could and did occur at higher levels, i.e. in excess of 80 $\mu\text{g}/\text{dl}$. Among their many recommendations, the Working Party called for the reduction of ambient mean air lead levels to the EEC recommended mean level of 2 $\mu\text{g}/\text{m}^3$. They recommended that particular attention should be paid to adventitious sources of lead, and to lead in paint. They also had no doubt that lead in tap water in some areas, such as Glasgow, could lead to raised blood lead levels in the population. Professor Lawther said that where children were affected by lead in water or lead in paint, for example, then any additional lead from whatever source was highly undesirable and the Working Party had therefore concluded that lead in paint, in food, in water and in air should be reduced wherever possible.

Professor Lawther's talk raised a number of interesting questions during the discussion, which examined the extent of the problem of lead in the environment and possible ways of implementing the recommendations of the Working Party. Representation at the meeting was diverse and included elected members of local authorities, local government officers, representatives from industry, researchers and students, and scientists working in the field of environmental lead. There was considerable praise from the floor for the DHSS report as an excellent scientific investigation of the research on the subject. It was felt that the report could be used as a text for setting out the criteria to which a manuscript must match up before it saw the light of day. Professor Lawther said that the sheer inadequacy of the refereeing of many of the papers that the Working Party had examined had been apparent; he also thought that many critics of the DHSS report could have read only the abstracts of these papers and had not therefore realised the inconsistencies or deficiencies in the papers themselves.

The discussion turned first to the question of lead in water. **Mr S.E. Cohen** (City of London) said that apparently new waterpipes would be necessary to solve the problem. He did not think that there were enough plumbers available to tackle a job of such magnitude. He wondered how the problem could be solved and how often pipes would need to be renewed. **Professor Lawther** said that new houses should not be equipped with lead pipes. It was important to identify areas in which the water was plumbosolvent enough, and plumbing old enough, to create problems, and concentrate action in those areas. He referred to a study of an estate in North Wales with lead piping, where children had blood lead levels in the region of 40 $\mu\text{g}/\text{dl}$; following prompt action to replace the lead pipes with copper pipes, the children's blood lead levels had fallen dramatically. The

results, which had been written up, almost enabled the half-life of lead in blood to be determined. Professor Lawther agreed that it would be uneconomic to search out and eliminate lead piping throughout the U.K.. However, the Working Party had fortunately not been required to take economic factors into account in making their recommendations.

Dr. J.M. Richards (Loughborough University) asked whether there was a coefficient, similar to Dr. Chamberlain's alpha factor, relating equilibrium lead levels in water to the corresponding values in blood. **Dr. M.F. Cuthbert** (Department of Health and Social Security) said that the relationship had been worked out by Stuart Pocock in Glasgow and was roughly on the lines that blood lead could be related to the cube root of the water lead. That seemed a very unbiological relationship, and nobody was yet certain whether it was true or not.

Professor R.S. Scorer (Imperial College) said that the eradication of lead piping in plumbosolvent areas was the responsibility of the local authority concerned; it was the duty of local authorities to do what they could in their own area, pass on the knowledge they had gained to their colleagues in other local authorities, and subsequently publicise their action to let the public know what had been done to solve a particular problem.

Another source of lead in the environment which concerned the audience was lead in paint **Mr. M.J. Gittins** (Leeds City Council), who had been struck by the number of areas identified in the report as needing further research, mentioned in particular lead in paint; he said that the difficulty was to find a real solution. The danger of removing lead-based paint was that more lead might be mobilised in the home during the removal process than there would have been if it had been left where it was. All the report had said on this point was "More research must be done". He wondered who, if anyone, was undertaking such research, or whether any such research was planned.

Mr. R.E. Waller (Medical Research Council, and a member of the DHSS Working Party) said that while the Working Party had taken great interest in new research projects, it had not been within their terms of reference to initiate a whole new campaign of research. They had been aware of the expense and time involved, which meant that research had to be taken step by step. Many of the government departments concerned were taking great interest in the Working Party's findings and recommendations and he believed that action was scheduled although priorities had to be established in relation to available resources.

The Working Party had discussed at some length the difficulties of removing lead-based paint from woodwork and the hazards involved during the removal process. In the U.S. there had been a big campaign to remove lead-based paint from houses and this had produced a new, 'paint-strippers', disease. Very careful hygiene controls were necessary in order to protect the operative from lead poisoning and to prevent the dispersal of lead dust in the home. The Working Party had concluded that the only real solution was to remove all affected wood-work and get rid of it elsewhere (without of course burning it). Some such major action might be required when houses were being modernised or rebuilt. There had also been reports in the literature of hazards associated with the demolition of

old railway stations, where lead paint had been used as an undercoat on ironwork. There had certainly been cases of lead poisoning amongst individuals engaged on the demolition work at such sites.

Dr W.C. Turner (Individual Member) felt that lead in paint was a psychosocial problem; in his own work on the subject he had found that many of the Mid-Victorian houses in run-down inner city areas had an enormous quantity of lead in their paintwork. He recalled one particular house which had been acquired and renovated; sixty layers of paint had been stripped off, each of which contained lead. He thought that well-maintained houses with adequate non-lead outer coats should not give rise to problems of lead in the house.

Dr. Turner also considered that the problem of children eating lead paint was related to other social factors; in the poorer inner city areas both parents often had to go out to work, leaving young children with a child-minder who might have several children in her care. Such children might not be stimulated at all during their period of minding, and might not be fed during that period. In such circumstances they could become extremely bored, with nothing else to do but chew their cot rails or other painted surfaces. The quality of the paintwork was of great importance because the child would have difficulty getting a lot of lead off a well-maintained paint surface, but if the paint was loose, old and flaky, great lumps of it could be chewed. The child's nutritional state was also an important factor. If the child was not eating at all, it would be hungry and would have gastric juices, including hydrochloric acid, to convert a lot of the lead into soluble lead chloride; the child would tend to absorb more lead under those circumstances. Dr. Turner felt that the problems of housing, of boredom, and the method of looking after children, had to be solved; they were the real social evils, rather than lead in paint. He agreed that stripping off lead-based paint was hazardous; it had been recognised for many years that burning off paint in shipyards, for example, where lead-based paint was still used, led to considerable exposure for the operative.

Professor R.S. Scorer (Imperial College) said that there seemed to be a widespread assumption that all problems could be solved by the appropriate research. It had to be recognised that many, such as the problem of lead in paint, were not soluble in the normal sense. They had to be lived with in one way or another. He suggested that parents should stop their children eating lead paint, rather than that lead paint should be eliminated so that children could eat what they liked. He also suggested that children should be told not to eat sweets that had fallen in the gutter, rather than that local councils should be told that they had a duty to make all dust safe enough for children to drop sweets into and then eat. He said that scientific research brought many other problems to light while the mechanisms of the problem actually under scrutiny were being revealed. An example of this was the work on the measurement of environmental lead undertaken by Dr. A.C. Turner of Warren Spring Laboratory (reported in *Clean Air* Vol. 10, No. 3, page 88). This work had revealed that lead dust was being carried from lead works on the wheels of lorries leaving the works, and on the shoes and even the hair of lead workers to their homes and thus to their children.

Professor Scorer said that research was also complicated by variations in meteorological conditions; it was always very difficult to correlate measurements which might take a month to make with the weather conditions over that period: it was nonsense to claim that all meteorological factors could be accounted for and correlated by computer

with measurements made; equally, such a correlation would not establish a cause and effect relationship. He thought that commonsense was often obscured by technical language, used not only by statisticians, but by those who used statistics without being aware of their limitations. Phrases such as: 'so and so was not significant' really meant that it did not exceed a certain level of significance; the crucial thing was the level of significance and the nature of the thing dealt with. The 'nature of the thing' was also important in deciding what to do about it.

Professor Scorer felt that the problem of environmental lead had to be seen in perspective. In 1980, 10% of the world's population was under-nourished; one in four pregnancies led to an abortion; one third of the world's population was under 15; the population would increase between 1980 and the end of the century by more than it had been *in toto* at the beginning of the century. Problems of such magnitude were beginning to be appreciated by a minority of intelligent people in the community and it was ridiculous to expect these people to consider lead in air, or lead in the environment generally, a major priority. That did not mean that environmental lead was an unimportant matter; Professor Scorer said that in every-day life, locally, lead in the environment was a legitimate concern. Every member of a local authority should take every opportunity within their power of eradicating lead paint or preventing emissions from lead works and seeing that the wheels of vehicles leaving the works were cleaned. However, he felt that lead in the environment should not be a top priority of the Government; if those concerned with terrifying global problems were pestered with such relatively trivial matters, then their attention would be distracted from the truly important world problems. A period of unparelled affluence had led people to expect that everything that could be put right at whatever expense would be done by the Government or some other authority. Professor Scorer thought that that way of life could not continue.

Dr. S.R. Craxford (Individual Member) took up Professor Scorer's remarks about children eating paint and dust-covered sweets and said that a lot of the trouble was due to people doing what they should not do. He considered education to be one of the most important means of combatting any problems with lead, and felt that efforts should be directed towards education rather than towards the enormous task of eradicating lead technologically. He agreed that local authorities should do everything in their power to remove lead in the environment as the occasion arose. He also felt that the National Society for Clean Air could do much, by a campaign of real education, to help to solve any lead problems there might be.

Dr. Jennifer Ratcliffe (University College Hospital Medical School) commented on the sometimes distorted reporting by the press and media of such issues as lead in the environment. She had recently been approached by a journalist with a view to writing an article on lead and had been struck by the fact that the journalist intended to quote studies which supported the case for the abolition of lead from petrol; the journalist had been very much concerned that lead in petrol was a considerable problem and intended to use scientific data to support that view. Dr Ratcliffe said that education was needed for those involved in environmental issues. She thought that the problems of assessing epidemiological and toxicological data were often not fully understood. The journalist had reinforced her view that people would choose whichever data they wanted to make use of to support their opinion, and would use it to suggest that theirs was a quantitative assessment of an environmental problem; she felt this to be a false use of scientific data. She thought that it was also important that those involved with environmental issues

should understand the difficulty of achieving a concrete answer in such fields. People often asked: "Why haven't we found the answer to the lead problem? What level of lead is safe?", and expected definite answers to such questions. The difficulties of doing epidemiological surveys, of matching children up and of trying to account for the other factors which affect intelligence could all be explained but such explanations did not necessarily convince those seeking a 'real' answer, who felt that the issue was being dodged or that scientific data was being used to support the opposite point of view. Those trying to be as objective as possible, within the admitted constraints of scientific research, could get quite annoyed when others insisted that unless they got the answer they wanted it was the wrong answer, or that the research had not been done properly.

Dr. Ratcliffe did, however, question whether the most appropriate research was being undertaken. Several people wanted to do more work on lead in air, and further surveys of lead in dust in London. She felt that the results could be predicted fairly accurately; although she did not wish to denigrate in any way the studies that had been done earlier which had shown particular sources to be important, she felt that for the future, surveys should be done in conjunction with studies of blood lead levels in the population, especially among young children.

The discussion then turned to the effect of lead on children. **Dr. J.M. Richards** (Loughborough University) asked whether, although there was apparently no evidence of acute effects of lead at levels below 35 $\mu\text{g}/\text{dl}$, there was a possible cumulative effect due to the persistent presence of lead at lower values in the blood.

Mr. R.E. Waller said that the Working Party had not been concerned with acute or short-term effects; the whole report dealt with long-term or chronic effects. Acute effects were reserved for the major poisonings, which they had not discussed. The Working Party had said that there were possibly effects related to blood levels between 35 and 80 $\mu\text{g}/\text{dl}$; here, they had been recognising that those effects might have taken place very slowly over a period of many years. Indeed, it seemed very likely that exposure to lead at sometime, perhaps early in life or even prior to birth, might produce effects on behaviour and intelligence that, at least reputedly, occurred at sufficiently elevated levels. Such effects were very slow to develop and be seen; they were long-term and *possibly* cumulative. It was difficult to distinguish cumulative effects from the long-term effects of a 'once-off' exposure. It was not known whether exposure to a very high level of lead in early life would have more or less effect than continuous exposure for several years at a slightly more moderate level. The subject required extremely complicated research with large-scale prospective studies, some of which were underway on a moderate scale.

Mr. T.H. Iddison (Environmental Health Officers Association) presented as a hypothetical case a child with pica, chewing lead paint from its cot and the windows and doors in its home. If an examination were made at the time, the child would clearly have a high blood lead level. If no such examination were made, and action taken at the time, he wondered how long that elevated level would continue and whether, if it subsided, there would be any evidence that the child had been subject to high levels of lead in the early years.

Mr. R.E. Waller said that if a child ingested a great deal of lead on one occasion in such a way, then there would perhaps be acute manifestations at the time and the child might appear in a paediatric department and clinical lead poisoning might be diagnosed. That would be an acute case and recognised as such. However, that exposure might lead

to subsequent long-term effects and it was indeed in such ways that fears about long-term effects developed, through following up children who had been presented at hospital earlier in life with clinical lead poisoning. On the other hand, the child might not reach the level at which it would be presented with acute lead poisoning; it might have a somewhat elevated level of blood lead which was not measured or recognised at the time. If the child then stopped chewing lead paint and carefully avoided any excess exposure to lead for a long time, the raised blood level would go back to normal within weeks, or months at the outside. Some lead would be deposited in bone and teeth and might possibly be detected subsequently. That was the basis for studies such as that of Dr. Needleman, who had examined discarded deciduous teeth from schoolchildren. Such studies indicated more clearly than current blood lead levels could whether a child had at any time been exposed to high levels of lead. Teeth could reveal the cumulative exposure to lead from the time the tooth erupted to the time it was shed. However, even if the child had a relatively acute exposure over a limited period, with little exposure to lead thereafter, this might still be missed in tooth lead studies, as the tooth lead level might not be noticeably raised. Yet one relatively large exposure might be sufficient to cause long-term harm.

Mr. S.E. Cohen (City of London) asked how many children died each year of acute lead poisoning. **Dr. M.F. Cuthbert** (DHSS) said that from the statistics available to DHSS it appeared that about 100 children were discharged annually from hospital with clinical lead poisoning. The statistics were based on the diagnosis on discharge so that it was fair to assume that in excess of 100 children were admitted to hospital in the UK each year with a suspected diagnosis of lead poisoning. Of these 100 children, about 2 or 3 died per year in the UK. As far as he could judge, these cases were almost entirely due to the habit of pica, with perhaps the occasional incident of exposure to some of the adventitious sources mentioned in the report. So far there had been no deaths attributable to lead in air, or lead in water; high blood lead levels and anaemia had been reported as due to these sources.

Professor R. S. Scorer (Imperial College) raised the question of the effect of air pollution, and lead in particular, on cyclists in inner city areas. There had been a letter in the cyclists' magazine, *Freewheeling*, from a reader who was worried about the effect of traffic fumes. Professor Scorer had cycled round London in the 1950s and used to come home with dirty clothes, practically scraping the soot off his eyebrows. By comparison, he found it a pleasure to cycle in London now and he was not worried by the air pollution. The increase in the number of vehicles on the roads caused problems for cyclists, but he did not think that the atmospheric conditions had worsened over the years. The expert who had replied to the letter in *Freewheeling* said that a cyclist did not have to worry about air pollution as much as a car driver would, even though the cyclist breathed twice as fast. Professor Scorer wondered whether other medical experts could confirm this opinion. He asked if it was true that a person who was really healthy and active could withstand much more pollution than someone more sedentary and less healthy, with a lower metabolic turnover.

Mr R. E. Waller, who also cycled around London, said that he had been an experimental animal all his life and had inhaled sulphur dioxide, sulphuric acid, coal smoke, to name but a few. Furthermore, he cycled every day, he took his own blood samples and

frequently measured the carbon monoxide and lead levels in his blood. He could confirm that cycling through the streets of London had no adverse effect in that respect. Indeed, it was a good way of getting rid of carbon monoxide in the blood. During the journey into the centre of London, he was able to blow off the carbon monoxide which he picked up in his kitchen at home, from the gas stove. The harder he cycled, the more air he breathed, and the more rapidly he got rid of the carbon monoxide. In fact he did not think he picked up much CO from traffic because he did not normally cycle hard behind the tail pipe of a car: when he was cycling hard, he was clear of cars and their exhaust emissions. The human body tried to maintain an equilibrium between the carbon monoxide in the blood and that in the surrounding air so that the body tended to lose more CO than it gained. In the case of lead this did not apply, because the uptake of lead was a much slower process. Nevertheless, in all the series of lead studies that he and Professor Lawther had done, he himself had had quite a low level of lead in blood, somewhere in the middle of the range at about 13 $\mu\text{g}/\text{dl}$. There was no evidence, even when he had deliberately cycled hard around London, that he had enhanced his own blood lead level.

Mr. Bradbury Williams (City Consultants Limited) said that it occurred to him that most bearings contained lead in the metal which would go into the crankcase oil. He wondered whether it was certain, therefore, that lead from motor vehicles came mainly from the petrol via the exhaust. **Professor Lawther** said that the answer to the question of the crankcase emissions could be provided by multiplying the frequency with which bearings had to be replaced by the percentage of lead in the bearings and equating that with the amount of lead in petrol multiplied by the amount of petrol used. He had no doubt that the majority of lead in city streets came from motor vehicle exhausts; lead in petrol was taken away in the crankcase oil by the scavengers added for that purpose, but he did not think that crankcase losses were a rich source of lead in air.

Councillor Terry Short (Nuneaton Borough Council) was interested in the wider aspect of the publicly expressed concern about lead in the atmosphere. He wondered whether lead in petrol should be reduced because of this concern. There would however be serious implications for the depleted car industry. As an elected member of a local authority, he had witnessed the growing public mistrust for expert reports of all kinds. The problem was that so many reports over the years had been used, one way or the other, either to justify an argument or to cover up a legitimate concern. People were increasingly suspicious of reports, no matter what their pedigree. In his own area of Nuneaton there was talk of opencast coal mining within a quarter of a mile of the new hospital; he could not tell people there that there would be no problem with dust, as they would not believe either him or the Environmental Health Officer; they had an inherent mistrust of the "official line". He was very pleased to see that the DHSS report allayed a great many fears about lead in the atmosphere and about the effects of lead on children but he wondered how this message would be received by people living near motorways. He felt that they simply would not believe the figures, and their reaction would be that all pollution was bad and that therefore lead must be eliminated. He could not see the Government taking a strong line on the probably unproven aspect of the health effects of lead in petrol, as they were not taking any precautions about the possibility of a high degree of atomic radiation in the country. The public, however, would

not accept Government inaction.

Mr C. A. White (London Borough of Hackney) said that there was a health and safety maxim "if in doubt, don't". The evidence for and against lead in petrol was not overwhelming in either direction; all things being equal he thought that the maxim he quoted would provide an appropriate philosophy. The extra cost to the motorist of removing lead from petrol would be one or two pence per gallon and, in view of the recent swingeing increases in the price of petrol, he thought most people would take that in their stride. Furthermore, he understood that the Ford Motor Company had estimated the deleterious effects on the engine of the scavengers added to remove lead at 2 pence per mile. Therefore, the removal of lead seemed to him to make good economic as well as good social sense.

Mr J. J. Beagle (London Borough of Hammersmith) asked why such technologically advanced nations as Germany and the United States had lowered or eliminated altogether the lead content of petrol if it had not been proved that lead in petrol was a health hazard. Members of the public put this question to him, as an Environmental Health Officer, and it was very difficult to answer.

The discussion by this time had centred on the question of the lead in petrol and the Chairman called upon **Dr John Weaving** (British Leyland) to answer Mr Beagle's question about U.S. and German regulations. **Dr Weaving** said that in the United States lead was removed from petrol because of the need to use catalysts in California and other places to prevent the occurrence of Los Angeles-type smogs. These catalysts were platinum-based and were "poisoned" by the presence of lead in petrol. In Germany, lead had not been eliminated from petrol but had been reduced to 0.15 grams per litre, the lowest level allowable under EEC regulations. The U.K., in common with other EEC members, had lowered the maximum permissible lead content of petrol to 0.45 g/litre and this would be reduced still further in January 1981 to 0.40 g/litre. Dr Weaving thought that it was right that EEC member states should take concerted action so that the opinion of many nations was reflected in the Government regulations of the individual member states. He said that if all lead were to be removed from petrol, the quality of the fuel would in effect decline from premium to regular grade. With regular grade fuel, it would be necessary to retard ignition, so that there would be poorer fuel consumption. The cost to the consumer was not simply the penny or twopence per gallon that Mr White had mentioned; the real cost lay in the extra energy required, highlighted by the fact that liquid fossil fuel was limited in supply. He felt that the whole problem was really one for the citizen rather than for the motor industry. As far as the motor industry was concerned, lead could not be removed from petrol immediately because many cars simply would not run on lead-free fuel. Lead in petrol could be reduced, but not eliminated overnight.

Mr Westerman (Nottingham City Council) asked whether there would be any directives, suggestions or even money forthcoming from Central Government for a co-ordinated national campaign to implement some of the recommendations in the DHSS report, to entail for example training and facilities for Environmental Health Officers and Medical Officers of Health. **Rear Admiral P. G. Sharp** (Chairman) said that there was no

Government Minister present and obviously any decision about what should be done would be a political decision to be taken by the Government. Whether there would be any money available for research would also be a matter for the Government. **Dr M. F. Cuthbert** (Department of Health and Social Security) said that the Government was taking the report very seriously indeed and a working group of the Cabinet Committee, with representatives of all the Government departments concerned, was actively discussing the recommendations of the Lawther Report. He anticipated that they would respond to the report by the Autumn of 1980, and say then exactly what the Government would do. He could not prejudge the issue as far as lead in petrol was concerned, but the Lawther Report had recommended a progressive reduction in lead emissions from traffic and it would be up to the Government to decide what the extent and the speed of that reduction should be.

Mr P. L. Ryan (Texaco Services Europe) was afraid that the Government might choose some easy option from all the priorities they had been given in the Lawther Report. The meeting had heard that it would be both difficult and expensive to remove all lead pipes; even if the problem were tackled only in plumbosolvent areas, this would cost a considerable amount of money and the expense would be borne by local authorities, now facing financial cut-backs. The difficulties of removing lead-based paint from buildings had also been explained and he felt that action against cosmetics and other adventitious sources associated with a cultural minority in the community would also raise unwelcome problems. Finally there appeared to be an easy option, the reduction of lead in petrol. He said that the oil industry hoped that the Government would give equal weight to all the various options available. Energy conservation was a major pre-occupation and reductions in the lead content of petrol would entail a severe energy penalty, an overall loss of about 5%. An alternative to reducing the lead content of petrol and consequently the lead emissions to air was to remove the lead at the exhaust pipe with a lead trap. This method would give a reduction in emissions equivalent to that obtained by the German reduction of the lead content in petrol to 0.15 grams per litre, and it would entail no energy penalties whatsoever. He thought that this alternative should be taken very seriously in view of the difficulties in oil supply, with the political disturbances in the Middle East, and the shortages that were foreseen for the future. **The Chairman** asked whether an expert from the oil industry could explain how the Germans had managed to reduce the lead content of petrol.

Mr. H. I. Fuller (Institute of Petroleum) said that the Germans had cornered the market on high octane components. Europe, from the point of view of an oil company, was a small pond, and all the oil companies operated in Europe and worldwide. The Germans had been able to keep their octane numbers up, in spite of the reduction in lead content of petrol to 0.15 g/litre, by purchasing high octane components from refineries that kept them available. If the U.K. decided to reduce lead to the German level then there would be competition for these high octane components and someone would lose out. Mr Fuller explained that petrol was blended from a number of constituents produced in the refinery from various processes; the various grades sold on the market were blended, like good quality whisky, from different feedstocks. High octane quality was necessary for the majority of motor cars on the roads; therefore, nature's rather poor octane

qualities, in crude oil, had to be improved either by processing, which required energy and heat and other crude oil in order to make the high octane, or the use of additives to improve the octane numbers. At present, lead was being added in small proportions, at slightly less than the maximum permitted amount of 0.45 g/litre (typically, on the English market, the actual lead content of petrol was less than .4 g/litre). If the amount of lead in petrol were to be reduced, then the octane number would go down. If lead was taken out altogether, four star quality petrol would become two star, i.e. 98 octane would drop to about 92 octane. If cars requiring four star petrol were run on two star petrol, they would knock destructively and eventually damage would be caused to the piston and the cylinder, and a new engine would be required. Some cars were made to run on two star petrol but the majority of cars would need to be redesigned before they could do so and this would entail re-tooling by the manufacturers. The average car on the road had a life expectancy of about seven years, so many cars would face severe problems. It would also take some years for the motor manufacturers to re-tool to make engines which would run satisfactorily on low octane fuel.

If the oil industry attempted to compensate for taking lead out of petrol by increasing the octane number at the refinery, they would have to build new processing equipment because the existing equipment was geared to the currently marketed product. New processing equipment would require steel which had to be made, which of course would entail additional energy consumption. The equipment had to be assembled and built which also took energy, and would have to run, again on additional energy. To gain the extra 5 - 6 octane numbers, from 92 up to 98, would require extra crude oil to be processed and, because the process was inefficient, there would be additional unwanted products such as tar. There was no easy solution: either the car was less efficient, or the processing of the petrol was less efficient. In addition, as the world shortage of oil began to bite, high octane petrol supplied by processing additional crude oil at the refinery would eventually mean that there would be less petrol available to supply the needs of the consumer.

The Chairman asked Dr Weaving of British Leyland exactly how long motor manufacturers would require for re-tooling if the Government decided to set a very low limit on the lead content of petrol. **Dr Weaving** said that it would depend on what level the Government set. It was deplorable to him that a jump from 0.40 to 0.15 g/litre should be contemplated. It would certainly be easier to cope with a progressive reduction in the lead content of petrol. If the lead content was reduced to 0.15, that would entail retarding of ignition. That would not require a long lead time, roughly a couple of years. Below that level there would be exhaust valve problems and the old population of cars on the road would suffer very badly.

Dr S. R. Craxford (Individual Member) wondered what the lead time for the oil industry would be if they had to produce high octane petrol without the addition of lead, and how much it would cost. **Mr H. I. Fuller** said that the lead time, from design to commissioning of the new process equipment required by the refineries, would be an assignment of about 5 or 6 years. The cost depended principally on how much crude oil would cost in about 5 or 6 years time; the additional cost would be 5% of the cost of the U.K. crude oil imports at that time.

Mr C. A. White (London Borough of Hackney) said that it also took energy to put lead into petrol. In addition, he presumed that refineries had a depreciation period, so that equipment would need to be renewed in the normal course of events. He asked **Dr Weaving** whether it was possible to adjust the distributor of a car so that it could burn regular grade fuel. He thought that this could be done with the Mini, and, if it was a simple adjustment, it could perhaps be made to many other cars. **Dr Weaving** said that it was not simply a question of "backing off" the distributor; although that would remove detonation low down, it would also leave the car understrength at higher speed and thereby losing fuel unnecessarily. An alteration in the strength of the distributor was really required, by altering the "slope" of the distributor as it advanced from low to high speed.

Mr P. L. Ryan (Texaco Services Europe) asked **Dr Weaving** whether he would prefer to produce a new engine designed to operate at 95 octane, and working on .15 g/litre lead petrol, or to fit an add-on device, i.e. a lead trap.

Dr Weaving said that many cars simply did not have room for a lead-trap device to be fitted in place of the silencer; certain panels would have to be re-tooled, which would be very costly. While lead traps would remove about 55% of lead before emission via the exhaust, the lighter particles, with a longer residence time in the atmosphere, would still escape. It would also be difficult to dispose of the lead traps without releasing the lead to air. He did not think that lead trap devices would be an acceptable solution.

The Chairman, **Rear Admiral P. G. Sharp**, concluding the discussion, said that clearly if the lead content of petrol was to be reduced, it could not be done overnight. The Government would have to take the decision to reduce the lead content of petrol still further, and obviously would have to consult the oil industry and motor manufacturers as well as motorists before deciding on a time-scale. The Lawther Report had recommended that the airborne lead should be reduced. Lead in petrol was not the only source of lead in air, and attention had also to be paid to smelters and lead works. The control of those processes had been tightened up considerably in the last ten years but there might still be room for improvement. Many people wanted a further reduction in the lead content of petrol, and Admiral Sharp personally sympathised with this viewpoint, but such action would take time and the Government must decide whether it was really necessary. While the meeting had heard that no child had yet died from lead in the atmosphere, many children were killed or permanently injured by motor vehicles on the roads. The problems of lead in the environment should be seen in perspective; there were many possible courses of action, and much could be done locally to eliminate sources of lead; but precipitate action should not be taken until the outcome could be determined.

Reprints of the report are being published and will be available, on request, from the National Society for Clean Air, 136 North Street, Brighton BN1 1RG, Tel.(0273) 26313.

DIVISIONAL NEWS

SCOTTISH DIVISION

Report on the Seminar held, June 2 & 3, 1980 at the Dunblane Hydro

In the light of the recent political elections and financial cutbacks the response and encouragement given by delegates from all over Scotland to the Scottish Division of the National Society for Clean Air was most encouraging, reflecting an understanding of the need to pursue and maintain a clean and bright atmosphere for all.

The following papers were presented —

“Coal — Its role in Energy Conservation and Pollution Control”

“Norit Clydesdale — a Case History of Planning and Pollution Control”

“Air Pollution in Homes — Carbon Monoxide and Nitrogen Oxides in Kitchens”

“Odour Control”

“Atomic Waste Disposal”

A short resume of the papers is as follows —

“Coal — Its Role in Energy Conservation and Pollution Control” J. GIBSON, CBE., MSc., Ph.D., Member, National Coal Board.

Dr Gibson, the opening Speaker, gave a comprehensive assessment of the role and future of the Solid Fuel Industry into the 21st Century.

The excellent paper covered not only the problems of winning of the coal but also the many uses to which it can be applied in future energy policies. The research and development of fluidised combustion was covered in some depth, indicating the faith the N.C.B. have in this relatively new form of energy raising. The research into the use of Coal in the Chemical Industry as well as various ingenious forms of the gasification of coal in-situ were also covered.

“Air Pollution in Homes — Management of Carbon Monoxide and Nitrogen Oxides in Kitchens” A. S. APLING, BSc., Ph.D., Senior Scientific Officer, Warren Spring Laboratory.

Dr. Apling gave a most interesting talk on this topical subject, using his W.S.L. Paper, “Measurement of CO and NO_x in Homes” as the canvas. The subjects used for his tests were colleagues at W.S.L., in modern homes. The levels of pollutants obviously closely followed the use of gas cookers and ovens but did not show any levels which could constitute a health problem. The continuous running of gas pilot jets gave higher levels within the kitchen. The trends to conserve heat in the home by reducing the air change, double glazing, etc., highlighted the point that pollution levels obviously must follow the ventilation patterns of the kitchen.

Concern was expressed by some delegates about the bed-sitter, single apartment with cooking facilities, where the occupant is exposed to these pollutants over a longer period, and may have poor ventilation because of efforts to conserve heat.

“Norit Clydesdale — Case History of Planning and Pollution Control” J. CHRISTIE, M.Inst.E., Deputy Divisional Officer, Air Pollution Division, Environmental Health Department, City of Glasgow District Council, and P. SWINSON, BSc., MSc., M.R.T.P.I. — Urban Renewal Directorate, Scottish Development Agency.

This joint paper by Messrs. Christie and Swinson covered the saga of “Norit” from the early days of building the Bluevale Flats in Glasgow to relocation approval by Glasgow District Council.

Mr Christie covered the efforts made in pollution control from the time that Planning Permission was granted to build multi-storey blocks adjacent to the Activated Carbon Works till the commencement of the Scottish Development Agency GEAR Programme.

Mr Swinson then continued the story by relating how through the Scottish Development Agency’s efforts in co-ordinating an Air Pollution sub-group, a special report by Warren Spring Laboratory and a Public Planning Inquiry led to the eventual planning approval with conditions and a Section 50 Planning Agreement between “Norit” and the Council for the resiting of the Works in the Cambuslang Redevelopment Area.

This paper was well received indicating clearly the necessity of close liaison between Planners and those concerned with the environment.

“The Working Party on Odour Control” R. PRIDE, BSc., FRIC., Deputy Chief Inspector, Her Majesty’s Industrial Pollution Inspectorate.

The choice of speaker, being a member of the Working Party, was most appropriate; Mr. Pride was able to speak with authority on the whole range of subjects. The paper covered, principally, the problem of odours from “Offensive Trades” premises — fish meal processing, gut works, etc., and the progress that had been made over the years. Probably the greatest advancement has been the technique of destruction of odours by burning.

“Atomic Waste Disposal” J.A. WILSON, BSc., ARIC., Inspector, Her Majesty’s Industrial Pollution Inspectorate.

The topical subject of Atomic Waste Disposal was dealt with by Mr Wilson. The complexity of the atomic energy waste control was clearly indicated by the speaker, particularly that of the solid waste. Though by its very nature this paper tended to be technical, Mr. Wilson’s presentation did stimulate some pertinent questions from the audience regarding the current forms of waste disposal by dumping in the ocean.

The social side to the Seminar was such that informal discussion between speakers and delegates was generated and this must be viewed as a bonus.

F. J. Feeley
Hon. Secretary

NORTH WEST DIVISION

Essay Competition — Clean Air Rules O.K.

Published elsewhere in this issue is the Essay which was judged to be the winner in the Senior (14-16) age group in the recent competition. The winner, 14 years old Miss Arshi

Sulaiman, from Colne Park High School, Venables Avenue, Colne, Lancs., chose a Raleigh Record 12 speed cycle as her prize. Miss Joanne Sainty won the Junior (11-13) age group and chose a Raleigh Magnum 10 speed cycle. Her school is Craven High School, Barnoldswick, Lancs., and each of the two schools received a music centre as part of the award.

The presentations were made by the Mayor of Oldham, Cllr. J. Campbell, at the Division's Annual General Meeting on July 11th. This was the climax of months of work during which the Education Authorities throughout the Division were circulated with publicity material and many individual requests for additional material were received.



Left to right: Mrs G. Robinson and Miss Arshi Sulaiman (Colne Park High School), Mr J. Teale (Chairman N.W. Division), Mayor & Mayoress of Oldham, Mr J.B. Douglas (Secretary N.W. Division), Miss Joanne Sainty and Mr T. Cockcroft (West Craven High School, Barnoldswick).

The aim was to get young people to think about Clean Air and its implications and to express their ideas in a short (1500 word) essay. Many varied and interesting essays were received and although one would not expect children to have the technical knowledge of the experts it was interesting to see how much information had been obtained.

In addition to the two main prizewinners the Division was able to present eight con-

solation prizes to runners-up and they were:—

(a) **Junior Age Group**

Miss T.M. Hosty,	Newton-le-Willows.
Miss S. Cooper	Ashton-in-Makerfield.
Master M. Lea,	Barnoldswick.
Miss C. Eastwood,	Southport.

(b) **Senior Age Group**

Miss C.L. Finn,	St Helens
Miss C. Bullen,	Bootle.
Miss Y. Pritchard,	Widnes.
Miss M. Johnson,	Widnes.

The £700 sponsorship for the competition came from the five main fuel industries and sincere thanks are expressed to the Merseyside and North Wales Electricity Board, the North West Electricity Board, North West Gas, the Central Electricity Generating Board and the National Coal Board, without whose help the competition could not have been run. The Electricity industries also assisted with the printing of publicity material.

Thanks are also expressed to Mr W. Pollitt, Councillor Mrs A. Burdon, and Mr W. Eckersley who judged the competition.

J. B. Douglas
Hon. Secretary

CLEAN AIR RULES O.K.

by

Arshi Sulaiman

North West Division Essay Competition, prizewinning Essay, 14-16 years age group

Environmental pollution is now one of the world's major problems. Air is a vital element in the maintenance of all mammals and a polluted atmosphere could only result in death. This is right, death! and if someone does not do something about it soon we are all going to find ourselves inhaling poisonous fumes which will eventually decimate the entire population. However, it seems rather pointless for me to state this fact now when four thousand people have already died.

Until quite recently heavy industry always appeared to be the chief culprit for the cause of wide spread pollution, but then came the Industrial Revolution. Enormous quantities of coal were burned as a source of power for the mills and undeveloped factories. As a result of this, smoke containing particles of unburned carbon was discharged into the atmosphere. The carbon consequently accumulated on the walls of surrounding

buildings and formed an outer layer of dirt. The other bi-product of the smoke was a chemical known as sulphur dioxide. When combined with water vapour from the air it forms a weak solution of sulphuric acid which is released as rain. Sulphur dioxide is probably one of the most harmful chemicals that man has ever accidentally released into the atmosphere. It corrodes buildings and has often been the cause of the now pitiful condition of many old architectural constructions. However, this chemical also affects plant mutations by attacking the inner tissues of organisms. This prevents from carrying out a process called photosynthesis which allows them to produce food.

Under certain particular weather conditions sulphuric acid combines with smoke and fog to produce a compound called "smog". During this period the sulphuric acid in the atmosphere is unable to disperse and the solution becomes much more concentrated, so that the air then contains double the amount of chemicals it had previously done. In the London smog of 1952 it has been concluded that a total of four thousand people died. Most of the deceased were elderly and suffered from bronchitis and other various lung diseases.

After that disaster the Government introduced the "Clean Air Act" of 1956. This effectively reduced the discharge of poisonous fumes within built-up areas and other conurbations. The Act was extremely successful at the time but now once more as industry gradually rears its ugly head the fumes and pollution are returning.

However, heavy industry is not the only source of pollution. The vast production of the wide spread motor car has now become a serious pollutant of the atmosphere. Petrol fumes released from the exhaust pipe emit a wide range of chemicals which are highly corrosive, including carbon monoxide. This escapes into the air together with unburned hydrocarbons and nitrogen oxides, which effectively pollutes the atmosphere further.

Having accounted for most of the general pollutants it is imperative not to omit the most recently introduced. That being the radio active discharge emitted from atomic bombs. In 1963 an international document was drawn up and signed. It stated that nuclear weapons would cease to be tested in the sea and other vast expanses of water. However, France and China failed to sign this international agreement and both independent countries have continued to explode atomic bombs into the surrounding oceanic expanses. But this dangerous step seems now to be affecting border countries and, if the radio active fall out reaches a dangerous level, complete cities could be instantaneously wiped out.

The latterly stated facts were ascertained as to the causes of environmental pollution, but the deep down root of all these causes has been a desire and lust to progress But if progress can conclude in such startling and harmful effects, what is the point of progressing any further? My opinion is that man will never be satisfied until he has reached his limits and can venture no further towards the depths of technology. But are futuristic developments and advances really necessary when one considers the harmful side-effects involved chronic lung disease can be produced and moreover the future generation will suffer

most. Radioactivity, smoke and other general pollutants are all gradually accumulating and they are slowly killing the human race. Statistic reports show that at least three elderly people in each industrial town die from exposure to harmful fumes and gases. That is the report for one large industrial area so just consider how many elderly people die of unnatural causes per annum.

Is it at all possible, or even feasible, to compare an industrial community with a typical country village? One looks at an industrial town and one sees grey skies, decaying trees and mutations. Smoke rising from filthy black chimneys. The factories are lined up like soldiers, all exactly the same. The whole atmosphere appears extremely depressing and eventually proves to be unhealthy. — But then, one sees the country. The lush green grass and the delicate blue skies with the sun glowing radiantly. The cottages are neatly arranged in orderly rows with tidy compact gardens, and several flowers. The air is fresh and appetising, healthy and enjoyable.

Actually it is areas like the one previously mentioned that make you appreciate the immediate clean environment in the outer suburbs. But in some areas of the countryside the authorities are considering poisoning the natural vegetation by dumping radioactive waste. So presumably if the bill is passed in the not too distant future we can expect our favourite pastoral retreats to be disposed of.

All aspects being considered, this planet is deteriorating completely. All the fair qualities of this Earth are gradually being thrown away, so that all that will remain will be a blue and green poisonous planet filled with smoke. Even if the whole world reformed, and tried to prevent pollution from spreading any further do you still think it would work? At this late date! Perhaps it would, but then again it may not, there is always the unknown factor that could change everything.... Only a total reform now could prevent the repulsive chemicals from spreading any further and doing anymore harm.

A mass campaign, in my opinion, should be launched outlining the need and recognition of the dangers caused by pollution and the futuristic developments that could destroy the planet.....Thirty years ago four thousand people died as a result of concentrated pollution and exposure to gaseous fumes — If you want to live in a healthy world make it healthy! Write to your Council and see how you can help, together with others in the great campaign combating environmental pollution, and remember, "Clean Air Rules, O.K.!"

VOLCANIC GAS ANALYSED AT HARWELL

Scientists at Harwell have begun to analyse samples of the volcanic ash from the erupting Mount St. Helens Volcano in Washington State, U.S.A.

The samples are being used to identify the gases which are emitted during volcanic eruptions, in order to predict their effects on the chemistry of the upper atmosphere.

The ash acts as a natural collector for such gases which it absorbs as it falls back through the volcanic plume (gas cloud) in the low temperature conditions at the top of

Mount St. Helens. The ash is collected in airtight containers from which the absorbed gas can be pumped off for analysis.

The analytical programme is centred on Harwell's gas chromatograph mass spectrometer — one of the most sensitive instruments of its type in the world for work of this sort.

Preliminary results indicate that significant concentrations of sulphur compounds such as carbonyl sulphide, carbon disulphide and sulphur dioxide may be present in volcanic emissions. Also many halogen compounds such as methyl and ethyl chloride have been found. Hitherto the presence of such compounds within the atmosphere has largely been attributed to man-made sources and the oceans. Volcanoes have not been considered significant sources.

The force of an eruption of the Mount St. Helens type throws the volcanic gases up a height of 60,000 ft. — directly into the stratosphere — and researchers are seeking to understand any possible effects these might have on the ozone layer and on the world's climate. The work at Harwell is designed to assist these studies by providing more specific identification and measurement than has been previously possible.

Investigations will also be carried out on the elemental composition of the volcanic ash and it is expected that the results will be published later this year.

The work at Harwell is being carried out by Stuart Penkett and Nigel Prosser of Environmental and Medical Sciences Division, and the programme is being undertaken in conjunction with Professor Rasmussen of the Oregon Graduate Centre in the USA, who supplied the samples. Financial support is being provided by the US National Science Foundation and the UK Department of the Environment.

LETTER TO THE EDITOR

Dear Sir,

I have read with interest the article concerning the sale of pre-packed Coal in Smoke Control areas in Vol. 10, No. 2 issue of Clean Air.

I can confirm that the Regional Secretaries of the Scheme will follow up with the Packer any cases that are found of pre-packed bags of coal for sale in Smoke Control areas which fail to have marked on them a message to the effect that the fuel is not approved for use in Smoke Control areas. This applies even if the Packer is not a member of the Approved Solid Fuel Packers Scheme.

Yours faithfully

J. F. Brown

National Secretary,

Approved Coal Merchants Scheme

MEASUREMENT OF GRIT AND DUST FROM SMALL OIL FIRED PLANT

The Clean Air (Emission of Grit and Dust from Furnaces) Regulations 1971 were made on 1st February 1971 and came into operation on 1st November 1971. They first

applied only to plant for which an agreement in respect of its purchase or installation was entered into after the date of operation but from 1st January 1978 they applied to all boilers, indirect heating appliances, and furnaces in which the combustion gases are in contact with the material being heated but where that material does not in itself contribute to the grit and dust in the combustion gases. The regulations require that, for all oil-fired packaged boilers above 825,000 Rtu/h, the emissions should at all times be less than 0.4% fuel oil consumed.

Since the regulations were made, the fuel oil supply situation has changed and fuel oils are now being supplied with viscosities nearer to their limits than previously. These are more difficult to burn on existing plant without an increase in emission of unburnt solids. It also appears that fuel oils are being supplied from a wider range of crude sources and that this might significantly affect emissions. Therefore, many boilers might not be able to meet the regulation limits at all times with their existing equipment.

The Society's Technical and Parliamentary and Local Government Committees considered the question of emissions from this type of plant and decided that some data was necessary in order to assess the seriousness or otherwise of the situation. The Society's Secretary General therefore wrote to Chief Environmental Health Officers in June 1980, asking:

- (a) Whether or not they were in a position to carry out measurements of grit and dust from small oil fired plant
- (b) Whether they did carry out such measurements regularly
- (c) What the results of such measurements were.

179 replies were received by 14.7.80. Of these, the majority (172) replied that they were not in a position to carry out measurement of grit and dust from small oil fired plant. Consequently, in these cases the answers to questions (b) and (c) were 'No' and 'Not applicable'.

15 of these local authorities pointed out that they had the necessary expertise among their staff to carry out routine measurements, but lacked the equipment to do so.

The majority of local authorities stated that grit and dust emissions of this sort were not a problem. Most local authorities appear to rely on complaints to alert them to any problem, and few mention receiving any complaints of this nature.

11 local authorities said that the main problem with small oil fired plant was excessive carbon, which coupled with conditions that predispose moisture in the flue, forms smuts. These are not measurable at any point in the system other than at the final discharge point. Other complaints related to odour, and in such cases the efficiency of combustion was checked.

24 local authorities said they would call in consultants to take measurements if necessary.

7 local authorities said that they were in a position to carry out measurements, but none carry out regular measurements as these are 'time consuming and costly'. If complaints are made, these are investigated and measurements made as necessary. In the majority of cases, emissions were found to be satisfactory, even where measurements had been made.

15 local authorities drew attention to the Department of the Environment Circular 2/71, of 10.2.1971, which reads:

"The Secretaries of State wish to remind local authorities that the measurement of grit and dust is time consuming and costly. In their view, the taking of measurements should be required or undertaken only in individual cases, when, after full consideration, it has been concluded to be necessary on account of particular circumstances."

It is obvious from the letters received that the majority of local authorities abide by this Circular, and, while they would call in consultants if necessary, they feel they cannot (in this time of financial stringency) afford to purchase the expensive B.C.U.R.A. equipment themselves, even where trained manpower is available within the environmental health department.

BOOK REVIEW

McCrone Particle Atlas, Edition Two, Vol. V. Ann Arbor Science Pub. Inc, distributed by John Wiley & Sons Ltd., Chichester., 1980. £50.00

In 1969 we* purchased the first edition of The Particle Atlas. If the usefulness of a book can be judged by the way it gets to look then our 'dog eared' and obviously used copy has proved its worth. We are well into the machine-computer age and it is human effort and understanding that has brought this about. No-one can deny that pure counting of particles is boring and it was this aspect that produced automatic counters and comparison techniques to judge particle sizes and distributions. Particle identification on the other hand can be an exciting task. Our own experiences in this subject have taught us the value of communicating totally understandable visual evidence. The Foreword of this latest Particle Atlas confirms this and reinforces the argument that Polarised Light Microscopes are as essential today as they were when first designed.

The book arms the investigator with 468 colour photographs of particles seen via polarized light. The photographs start with Pollens and end with House and Road Dusts. The Plane Polarized lighting system used for the 90 Pollens recorded makes comparative judgement simple and interesting. Accompanying technical data is clear and concise. When you have exhausted the Pollens the Atlas continues through the Earth Minerals, Oxides and Hydrochloride varieties of Heroin and Morphine plus a wealth of information that should be of great use forensically.

The choice of magnification power makes comparative study very easy, for example if you were run over by a Camel on a dark night the hairs on your person would line-up well with the Camel example and not be confused with hairs from smaller animals such as Mink and Fox. Our own research is concerned with the numerical and physical aspects of particles in hydraulic power fluids. This does not mean that we are concerned only with wear debris but with the total concept of contamination and this has led us to include air monitoring in our work, to establish the effect of air particulate on fluid power systems.

An experienced microscopist works mostly from memory in the field he has come

to understand, and the more experienced he is, the quicker he will be in drawing accurate conclusions. In our experience of viewing the contamination states of oil and air we have come to understand how such things as fly ash cenospheres can get into power fluids. To do this we established first that the trapped particles were cenospheres, and secondly, that similar cenospheres could be found in the machine's environment, and thirdly, that the cenospheres could bypass the machine's air filters protecting the hydraulic fluid reservoirs. Reference to the Particle Atlas produced information on fly ash cenospheres in Volumes 1 and IV so for our purposes it was necessary to explore the total Atlas. This review covers Volume V and the earlier praise must take into account our assumption that particle research laboratories would normally use the complete Atlas, although an index for the individual volume as well as that provided for the Atlas as a whole would be useful.

The colour photomicrographs in Vol. V attract attention immediately but the Atlas is also very readable. The subjects and techniques covered are:

I. The Laser Raman Microprobe; II. Hoffman Modulation Contrast; III. Dispersion Staining; IV. Refractive Index Liquids; V. Microchemical Reactions in Particle Identification; VI. Colour Photomicrography for the Particle Atlas; VII. Organisation of the Particle Atlas; VIII. Photomicrographs, and Descriptions; IX. The Determination of Geographical Origin of Dust Samples; X. Microscopical Examination of Air Pollutants; XI. Identification of Asbestos by Polarized Light Microscopy; XII. Particle Analysis in the Crime Laboratory; XIII. Application of Particle Study in Art and Archaeology; XIV. Literature Survey; Index for Vols. I-V.

The manner of writing and the treatment of the subject are excellent in all cases and follow the high standards set in the very first Atlas. McCrone's observations in section VI show that he and John Delly were determined to ensure maximum readable information for microscopists (and amateurs) from their constructed photomicrographs. All in all a superbly produced book.

*Thermal Control Co. Ltd.

Alan Goldsmith

INTERNATIONAL NEWS

an IUAPPA publication

5TH INTERNATIONAL CONGRESS, BUENOS AIRES, OCTOBER 20-25, 1980

The President of IUAPPA, Dr Jose A Rispoli, has announced that Dr Mustafa Kemal Tolba, Director General of the United Nations Environment Programme, will be attending the 5th International Clean Air Congress.

ACID RAIN

The ecological impact of acid rain was the focus of a major international conference held in Sandefjord, Norway, in March 1980. The conference was attended by 300 scientists from 20 countries and coincided with the completion of a 9-year, £8 million, Norwegian research programme on the effects of acid rain on forests, lakes and rivers (the SNSF

project). Research on acid rain is underway in many countries: the recently signed UNECE Convention and Resolution on long-range transboundary air pollution should assist in international co-ordination of research and assessment of results. There are still many uncertainties about the effects of long-range transportation of pollutants, but there is increasing concern about the problem of acid rain in Canada and the United States.

The effects of the long-range transport of air pollution lie in the tendency to cause an acidification of rainfall above that caused by gases naturally present in the atmosphere. This acidification has no effect on human health and, as the scientists at the Sandefjord conference agreed, no decrease in forest growth has been demonstrated as a result of acid precipitation. However, in their closing statement, scientists attending the conference declared that atmospheric transport of sulphur and other pollutants has led to extensive regional acidification of watercourses in areas with very little neutralisation capacity, both in Europe and in North America.

Trends in rain acidity and sulphate content are difficult to plot. In Northern Europe the European Air Chemistry Network (EACN) was established in 1955; sites are widely scattered and have operated sporadically but some have given continuous records for 20 years. In the US, there has been a single set of continuous records from 1963 at Hubbard Brook, New Hampshire. The EACN results show that there are very wide variations in the annual acidity records, by factors as great as 4 to 1 in consecutive years. The trend in acidity prior to the mid-60s was approximately level and perhaps slightly downward. The trend from 1965 onwards is the same. There is, however, a marked and abrupt upward change in the mid-1960s. This might be due to changes in the rainfall sampling and analysis methods which were introduced in the 1960s. However, if it is a genuine feature, then the smooth trend over 20 years is an increase in acidity of about 10% per annum. The Hubbard Brook results show no trend in rainfall acidity from 1964 to 1974. Trends in excess sulphate at the EACN site show an identical pattern to the rainfall. Since 1965 the trend has been downward. At Hubbard Brook there has been a small downward trend over the same period and possibly for longer, although recent publications of rainfall acidity contours shown an upward trend.

Scientists at the Sandefjord Conference also concluded that acidification of watercourses has had major effects on life in rivers and lakes.

Fish populations in rivers in Southern Norway have been declining since 1890; about half the fish had gone by 1920. Fishstocks can be affected by a variety of human activities and unrestricted netting of game fish has only recently been brought under legislative control in Norway, after protests by the angling fraternity that overfishing had dangerously reduced stock. In recent decades, lakes in an area of 13,000 square kilometres in Southern Norway have become empty of fish, while in a further area of some 20,000 square kilometres, lakes have significantly reduced fishstocks. Trends in fishstocks in Norwegian lakes were determined by interview and questionnaire, and these were then compared with spot measurements of acidity.

A healthy lake has a pH of about 7.0 and sometimes a little higher. Pure water precipitation in equilibrium with the carbon dioxide of the atmosphere will attain a mildly

acidic level of pH 5.6. Additional absorption of SO_2 and NO_x will reduce the pH, ie the acidity will be increased. Where the pH of a lake drops to around 5.0 there is a marked decline in the variety of invertebrate animals, and some species of fish disappear. Water with a pH below 4.0 is lethal to fish of the salmon family. As the acidity of a lake increases, its waters become clearer and there is a shift in the aquatic flora from higher plants towards mosses and algae. However, rain percolating through vegetation and soil can acquire acidity both by processes of ion-exchange and by the leaching out of natural acids from decomposing humus. The latter acids can at times represent an important fraction of the total acidity in the rivers. These reactions mean that the composition of lake and river water may bear little resemblance to that of the rainfall. But a significant relationship between sulphate and acidity has been demonstrated for a group of lakes in Southern Norway. A great deal more research is needed on the effects of acid rain on watercourses and fish-stocks and scientists at the Sandefjord conference called for continued monitoring and research efforts.

In the meantime the Scandinavian countries, and Norway in particular, continue to press other European countries to reduce their total sulphur and nitrogen oxides emissions.

INDIA

Environmental Agency Proposed

The Government of India has been urged by environmentalists to set up a Central Environmental Agency under the care of the Prime Minister to direct and organise coordinated action to tackle various aspects of ecology and conservation. The meeting of the noted environmentalists was convened by Mrs Indira Gandhi, the Prime Minister of India, in New Delhi on 2nd April, 1980.

The proposed agency will help coordinate the efforts of as many as 16 different departments which now handle conservation problems at the Centre and in the States.

It was felt that the environmental problems should be tackled in a methodical manner. More urgent aspects should be attended to immediately, while long-term plans would take care of other matters.

It was suggested that the stress in conservation programmes should not be on animals alone. Botanical aspects required as much care. Some of the world's most important plant species are to be found in North-east India and special care should be taken to preserve them.

Mrs Indira Gandhi remarked that no conservation programme could possibly succeed unless efforts were made to tackle the real needs of the people for items like fuel.

NORWAY

Norwegian researchers are trying to develop a wood-burning stove which would extract gas from wood and burn it as a pollution-free fuel. Wood-burning stoves are traditional appliances for home heating in Scandinavian countries and have recently been widely advertised in the UK. However, none of the domestic wood-stoves sold in this country have been officially approved by the DOE for use in smoke control areas. The search for a new system involves production of an intense flame even when very small quantities of wood are burnt. The research is being carried out jointly by Jotul, the Institute of Technology and the Norwegian Defence Research Establishment.

SMOKE CONTROL AREAS

Progress Report Position at 31st March 1980

(Figures supplied by the Department of the Environment, the Welsh Office, the Department of the Environment for Northern Ireland and the Scottish Development Department).

	England		Wales		Scotland		Northern Ireland	
Smoke Control Areas Confirmed to 31.12.79	5,135	34		280		81		
Acres	1,794,274		3,331	10,754	156,287	19,421		
Premises	7,501,466				638,000	58,588		
Smoke Control Areas Confirmed (1.1.80 - 31.3.80)	30	1						
Acres	11,969				479			
Premises	48,093				2,372			
Totals	5,165	34	3,331	10,754	156,756	19,421	81	58,588
Smoke Control Areas Submitted (1.1.80 - 31.3.80)	31			3				
Acres	19,854				5,332			
Premises	56,648				1,742			
Grand Totals	5,197	34	3,331	10,754	162,088	19,421	81	58,588
Smokeless Zones (Local Acts) in Operation	44							
Acres	3,400							
Premises	41,060							



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NEW SMOKE CONTROL ORDERS

The lists below are supplementary to the information in the issue of **Clean Air (Vol. 10, No. 2)** which gave the position up to **31st December 1979**. They now show changes and additions up to **31st March 1980**.

Some of the areas listed are new housing estates; or areas to be developed for housing. The total number of premises involved will therefore increase.

The list of new areas in operation of smoke control is based on the plans submitted to the Department of Environment, but may erroneously include some local authorities who have made postponements without notifying the Ministry of the fact.

ENGLAND

NEW SMOKE CONTROL ORDERS IN OPERATION

North West

Pendle (Barnoldswick No. 2).

West Midlands

Warwick No. 15.

NEW SMOKE CONTROL ORDERS CONFIRMED BUT NOT YET IN OPERATION

Northern

Castle Morpeth No. 2; Gateshead No. 14 and No. 16; Langbaugh No. 7 (Redcar, Lord Street West); Stockton-on-Tees No. 18 (Roseworth South) and No. 19 (Mount Pleasant).

North West

Bolton No. 16 (Bolton No. 55a); Ellesmere Port No. 17; Oldham No. 31 (Grotton); Preston No. 41; Rochdale (completion) No. 6; Stockport No. 21 (Bredbury/Woodley); Wigan (Ashton No. 3).

Yorkshire & Humberside

Barnsley No. 30 (Darton), No. 31 (Barugh) and No. 32 (Darton); Scunthorpe No. 13.

West Midlands

Coventry No. 23 and No. 24; North Warwickshire No. 6; Wyre Forest No. 4.

East Midlands

Broxtowe No. 4 (Kimberley); Rushcliffe No. 3; South Kesteven No. 11 (Grantham No. 27).

South West

Cheltenham No. 10 (College Gardens) and No. 11 (Moorend Park).

South East

Canterbury (Studd Hill No. 1); North Bedfordshire No. 11; Southampton No. 20 (Freemantle No. 2).

London Boroughs

Hillingdon No. 38.

SMOKE CONTROL ORDERS SUBMITTED BUT NOT YET CONFIRMED

Northern

Gateshead No. 14, No. 15 and No. 16; Langbaugh No. 7 (Redcar, Lord Street West) and No. 8 (Redcar, Lord Street East).

North West

Blackburn No. 20; Manchester (Colleyhurst Street, extension); Preston No. 41.

Yorkshire & Humberside

Barnsley No. 33 (Staincross), No. 34 (Staincross), No. 35 (New Lodge), No. 36 (Hoyland); Leeds No. 9 (Garforth South); Sheffield No. 31 (Chapelton).

West Midlands

Coventry No. 23 and No. 24; Warwick No. 18 and No. 19; Worcester No. 1; Wyre Forest No. 5.

East Midlands

Rushcliffe No. 3; South Kesteven No. 11 (Grantham No. 27).

South West

Cheltenham No. 10 (College Gardens) and No. 11 (Moorend Park).

South East

Brighton No. 5; Broxbourne No. 11; Canterbury (Studd Hill No. 1); Gravesham No. 6; North Bedfordshire No. 11; Portsmouth No. 6; Southampton No. 21 (Bevois Town).

SCOTLAND**NEW SMOKE CONTROL ORDERS
IN OPERATION**

Dumbarton District (Renton); Edinburgh District (Drylaw No. 1) and (Royston No. 2); Nithsdale District (Lochside North).

**NEW SMOKE CONTROL ORDER
CONFIRMED BUT NOT YET IN
OPERATION**

Edinburgh District (Comely Bank).

**NEW SMOKE CONTROL ORDERS
SUBMITTED BUT NOT YET
CONFIRMED**

Edinburgh District (Braid); Hamilton District No. 9; Nithsdale District (Annan Road).

**CITY OF LONDON TO CELEBRATE 25
SMOKELESS YEARS**

The City of London will celebrate the 25th Anniversary of their Smokeless Zone on the 2nd October, 1980. There will be an exhibition in the Guildhall commemorating the event, in the week commencing 29th September.

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INDUSTRIAL NEWS

International Consulting and Laboratory Services

The scientific consulting Companies Bostock Hill and Rigby, Thresh, Beale and Suckling, Consultox Laboratories and Environmental Analysis Limited wish to announce that in future they will offer their combined services under the new title I.C.L.S. LABORATORIES LIMITED.

In the U.K. services will continue to be offered from the Birmingham and London addresses, while overseas Companies in the group operate from Singapore, Malaysia, South Africa and Holland.

The group specialises in all fields of scientific studies, including:

Potable and wastewater treatment, factory surveys, plant design, supervision of erection and commissioning, negotiation with Regional Water Authorities, and regional water pollution studies.

Atmospheric pollution studies of solvents, dusts, asbestos, metals and fumes, including surveys and analysis. Liaison with H.S.E., EMAS, and other regulating bodies. Preparation of safe handling procedures for dangerous materials.

Examination and survey of contaminated sites, including gasworks, sewage and chemical works, tips, electroplating shops and scrap-yards. Design of remedial measures and supervision of their execution. Assessment of the hazards to site staff, occupants, watercourses and wild life.

Analysis of foodstuffs, beverages, water, chemicals, pharmaceuticals, fuels and soil. Microbiology of water, foodstuffs and pharmaceuticals.

Consumer Protection Services including forensic science, loss adjusting services, expert witness and interpretation of consumer and other legislation.

New fields into which the group is

expanding are energy conservation, virology and environmental impact assessment. Reader Enquiry Service No. **8046**

British Designed Helmet aids Volcano Disaster Relief

American police and rescue workers battling against thousands of tons of volcanic ash from the Mount St. Helens disaster have been relying on a British designed safety helmet to protect them from clouds of choking dust.

Within hours of the devastating blast that spread vast quantities of ash all over Washington and surrounding states, industrial safety company Racal Airstream Inc. had rushed in Airstream anti-dust helmets to help protect key workers. The helmet's air filtering system — which has proved effective in many industries — kept the lung-searing dust at bay while emergency services swung into action. Traffic police, rescue teams, road clearing crews, Red Cross workers and even the Mayor of one affected town were all issued with Airstream.

A team of Racal Airstream engineering and technical experts, under general manager Ken Vaughan, set up emergency headquarters in two of the worst affected towns - Yakima, Washington, and Portland, Oregon. Here they gave valuable advice and provided free Airstream helmets to essential staff on rescue and cleaning duties. The helmets were particularly effective for police directing traffic. One officer reported being unable to see his parked car 25 feet away because of dense dust clouds, but was unaffected himself due to the Airstream helmet. Other workers said chest pains, severe eye irritations and nausea caused by dust were all relieved when they were issued with the helmets.

Reader Enquiry Service No. **8047**

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VOL.10 NO.5





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CLEAN AIR

THE JOURNAL OF THE NATIONAL SOCIETY FOR CLEAN AIR

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NSCA NOW HAS INTERNATIONAL NOISE ROLE

The National Society for Clean Air is now an Associate Member of the International Institute Against Noise. Founded in 1959, the IACB is to noise what IUAPPA is to clean air, but whereas IUAPPA has a worldwide membership, the IACB is at present largely a European organisation, with its registered office in Zurich. The aims of the Association are to inform and educate the public on matters relating to noise control and to secure the reduction of noise through changes in legislation and advances in technical controls. An International Congress is held every two years. Professor J.C. Remy, President of the Ligue Francaise Contre le Bruit and Vice-President of IACB, who approached the Society about becoming a member of IACB, feels that we can make a valuable contribution to the work of the Association; the Society is committed to reducing noise in the environment and, increasingly, the Society's members have a professional interest and expertise in this field.

Noise matters are discussed at our conferences and seminars, in committee and at Divisional meetings. We have not, however, devoted much space to the subject in this journal before now. I hope that this can be remedied, with your co-operation. I would welcome reports on meetings, or on local issues, concerning noise. I am particularly interested in publishing brief articles or full papers describing technical experience in noise measurement and noise control - technical or administrative. Judging by the discussion at the Bournemouth Conference, there should be no shortage of excellent contributions. Authors and delegates expressed forceful views on noise from road vehicles, low frequency noise, noise from industrial, commercial and mining operations, and of course, neighbourhood noise. An entire session of conference was devoted to noise, and the subject was raised during the discussion periods at other sessions. We shall shortly publish the proceedings of the conference, and a full report on the event will appear in the next issue of Clean Air.

STUBBLE UP IN SMOKE

In spite of the agreed code of practice for burning straw and stubble, this increasingly popular agricultural activity is causing problems near residential areas and roads all over the country. Accidents on the A14, the M3 and the M4 have been reported as being a result of dense clouds of smoke obscuring visibility on roads adjacent to fields in which stubble was being burnt. Provisions of the code that are being ignored are the ban on fires within 50 feet of a public highway, advance warning to neighbours and fire brigades, no fires on windy days, provision of firebreaks, provision of mobile water tanks, and the supervision of all burning fields until the fire is out. Stubble burning should be done under carefully controlled conditions in order to minimise smoke nuisance, the risk of accidents on the road, and other hazards.



Smoke from stubble burning, Saltdean East Sussex. Picture by Ron Fortune, Brighton & Hove Gazette September, 12th 1980.

The Council for the Protection of Rural England (CPRE) have been urging local authorities to adopt the model byelaw on straw and stubble burning drawn up by the Home Office. Several local authorities have been seriously concerned about the problem and, in the absence of any legislation from Central Government, a local byelaw would be the next best thing. The text of the model byelaw is set out in full overpage.

STUBBLE BURNING – MODEL BYELAW

1. This byelaw shall extend to

BYELAW

2. No person shall on agricultural land commence to burn any straw or stubble remaining on such land after the harvesting of any crop which has been grown thereon, or cause or permit to commence the burning of such straw or stubble:
 - (a) in a field or enclosure any part of which is within 15 metres of:
 - (i) any residential property;
 - (ii) any structure having a thatched roof;
 - (iii) any other building, fixed plant or machinery the greater part of which is constructed of combustible material;
 - (iv) any stack of hay or straw;
 - (v) any accumulation of combustible material;
 - (vi) any standing straw crops;
 - (vii) any woodland, hedgerow or nature reserve; and
 - (viii) any plant or apparatus of combustible material owned by any statutory undertaker

unless before any straw or stubble is burnt a fire-break is constructed by removing so far as is reasonably practicable all straw from a strip of land not less than 15 metres wide between any straw and stubble proposed to be burnt and any of the objects referred to in paragraph (a) of this byelaw and either cultivating the said strip of land or ploughing not less than 3 metres in width of the said strip of land:
 - (b) between the hours of sunset and sunrise;
 - (c) unless during the whole of the time the straw or stubble is burning the operation will be under the supervision of a responsible person present in the field or enclosure; and
 - (d) unless not less than 24 hours notice has been given to the County Fire Brigade. *

3. In this byelaw:-

"combustible material" means "Capable of undergoing combustion"

"combustion" means "Consumption by oxidation with the production of heat, usually with incandescence or flame or both", as defined in BSI Standard No. 4422

"nature reserve" has the same meaning as in section 15 of the National Parks and Access to the Countryside Act 1949.

PENALTY

4. Any person offending against this byelaw shall be liable on summary conviction to a fine not exceeding £200.

* The adoption of this provision is optional and it may be omitted if the County Fire Brigade does not require that such notice shall be given.

DIVISIONAL NEWS

WEST MIDLANDS DIVISION

Thirty members attended the Annual General Meeting of the Division which was held at the University of Aston in Birmingham on Wednesday, 25th June 1980. Councillor G.T. Randall was re-elected Chairman of the Division, Mr. H.E.T. Lowbridge was elected Vice-Chairman, Mrs. K.J. Sulway was elected Honorary Secretary and Mr. D.A. Spurrier, Honorary Treasurer.

After the AGM, members of the Division were able to attend the seminar on "Traffic Pollution in Shopping Streets" organised by the Joint Unit for Research on the Urban Environment (JURUE), at the University. The main purpose of the seminar was to look at the problem of air pollution in urban areas and in particular to consider the environmental impact of traffic pollution in shopping streets. Individual papers examined predictive models and area-wide pollution, the environmental impact of traffic in the West Midlands and the infiltration of traffic-related pollutants in shops.

A paper by Dr. Robert Pocock (Research Fellow, JURUE,) entitled "The Value of Predictive Models in Air Pollution Assessment" showed the usefulness of modelling methods for predicting air pollution levels and indicated that predictive models may be of use to local authorities in their assessment of the degree and significance of actual or possible pollution problems. The paper also described certain types of model and their accuracy, in particular the use of an urban scale SO₂ dispersion model. This model, developed at JURUE, was used to predict areas in the West Midlands where pollution levels were likely to exceed the levels recommended in the forthcoming EEC Directive on Smoke and SO₂. The results of the model were shown to be useful in adding more detail to maps devised by Warren Spring Laboratory using National Survey Site measurements.

Mr. Hugh Williams (Deputy Director, JURUE) gave a paper entitled "The environmental Impact of Traffic in the West Midlands" which assessed the methods of predicting levels of traffic pollution and discussed models developed at JURUE for the prediction of kerb-side CO, smoke and noise levels. The paper also considered the spatial and temporal characteristics of pollution in streets and major factors influencing observed pollution conditions. The results of a study conducted by JURUE into the impact of traffic in the West Midlands County were also discussed.

The final paper by Mr. Tony Martin (research student, JURUE) was entitled "Levels of Traffic-related Pollutants within Shops". As most city dwellers spend much of their time indoors, infiltration of pollutants from the outside to the internal environment is important. The paper discussed the factors likely to influence the infiltration of pollutants into shops with particular reference to building ventilation and indoor furnishing materials. Results of a pilot study into the levels of pollution within shops in the West Midlands were discussed. Shop size, ventilation and type of indoor furnishing material were found to have a bearing on the levels of pollution infiltrated from the adjacent road. A more detailed investigation into this problem is now being undertaken. The seminar was con-

cluded with an open forum in which members of the Division and other members of the audience took part in a stimulating discussion which raised some interesting issues.

Footnote: Further information concerning the activities of JURUE and a list of publications is available from the Publications Secretary, Mrs. L. Bloy, Joint Unit for Research on the Urban Environment, University of Aston in Birmingham, Gosta Green, Birmingham B4 7ET.

Recently the West Midlands Division met (Tuesday 21st October) at the Chatterley Whitfield Mining Museum Trust, Chatterley Whitfield Colliery, Tunstall, Stoke-on-Trent. Mr. D.E.A. Evans, Fuel Technologist from the National Coal Board, gave a lecture on the future role of coal for both domestic and industrial use, with reference to advances in firing and pollution control. After lunch, there was a guided tour 700 ft below ground, led by experienced miners.

K.J. Sulway
Hon. Secretary

MONITORING — WHERE NEXT?
NSCA Workshop — April 8 and 9, 1981
Henderson Hall, University of Newcastle upon Tyne

Subjects: Who Needs Monitoring?

Dr L.E. Reed, Department of the Environment

Does the Monitoring Programme Meet Local Requirements?

F.G. McQueen, Borough of South Tyneside

The National Survey and its Future

Dr A.W.C. Keddie, Warren Spring Laboratory

Liaison between Organisations Monitoring the Atmospheric Environment — Central Government, Local Authority, Industry etc.

R. Emerson, Borough of Hartlepool

Instrumentation

Dr J. Jarvis, Cape Industries Ltd., Environmental Services Laboratory.

The Presentation of Results

(Speaker to be announced)

Heavy Metals Surveys — Future Needs

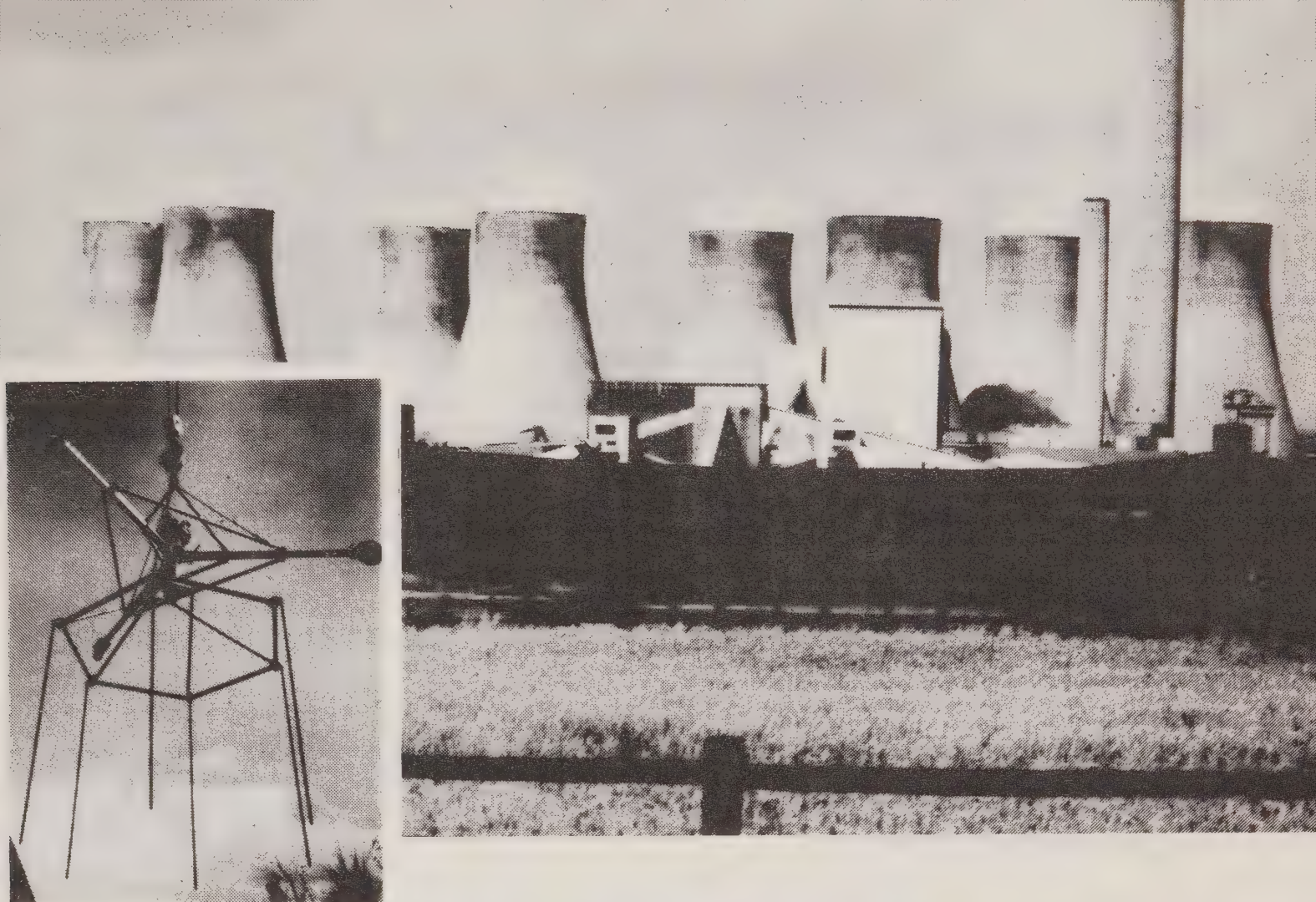
J.P. Giltrow, HM Alkali & Clean Air Inspectorate

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Dr M. Schwar, Air Pollution Group, Scientific Branch, GLC

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BOOK REVIEW

Mathematical Modelling of Turbulent Diffusion in the Environment

Ed. C.J. Harris, Academic Press, £18.00

Turbulent diffusion in the air and bodies of water is of fundamental importance to life on earth, and so it is natural that applied mathematics should attempt to say something about it; after all much of our modern way of life is based on a mathematical understanding of our physical environment.

Because turbulence is a very complicated phenomenon simple mathematics is not adequate to the task. Because those who work in this field are more interested in the diffusion of pollution or other components of the air or water than in the mechanics of the fluid itself, and because turbulence makes itself more complicated all the time so that no full description is possible, most theories are not theories about the turbulence at all, but about the consequences.

Thus statistical theories, which represent some overall effect of the turbulence without reference to the details which achieve it, are various ways of representing the diffusion by a quite different phenomenon such as a random walk or a conduction process like the conduction of heat.

It is fashionable today to talk about "mathematical modelling", as if that were something rather new. Actually it is what mathematicians have done ever since they first drew a diagram and used Euclidean geometry to calculate things: but it has become rather fashionable and is thought to give status to other sciences and technologies which have lacked it in the past. The art of modelling, of course, is not in making it sophisticated and difficult, although that is part of the game, but in finding the very simplest model which is as good in practice as the much more sophisticated ones.

In the great outdoors we have, particularly in the atmosphere, an unending succession of different cases, whereas it is a characteristic of the models that they refer only to particular cases. One is always bound to wonder whether the models are relevant enough to be worth the bother. We find on page 3 of this volume the statement ".....prediction in practical cases has still, unfortunately, to be made using empirical assumptions, not justified by (or even consistent with) theory". Unfortunately the authors of most of the papers in this volume are more concerned (in this volume) with the properties of the models rather than the ways of nature. This is a valid exercise but it does not carry much conviction for the practical person who is really concerned with the behaviour of a fixed installation in an infinite variety of flow patterns.

In the case of tidal estuaries, where the flow is confined and mainly periodic, progress can be made by mathematical and physical modelling, and results can be continually improved by making appropriate measurements. But in the case of the emission of hot or polluted water into an estuary the vagaries of the weather add a variability which is dominant.

It is important, therefore not to expect too much from this symposium in which 21 authors present 14 essays which are fairly well indexed. They are uniformly set in type-writer type which has meant that the customary range of type for mathematics is not available. It is annoying that the diagrams are not set in the text, but at the end of each article after the references, because a good diagram greatly embellishes the reading when appropriately placed.

This book is the proceedings of the first conference under the aegis of the Environmental Mathematics Group of the Institute of Mathematics, held in Liverpool in September 1978. It is not a complete or uniformly rigorous text and is not likely to have much impact on practitioners who have daily to handle diffusion of pollution. It may however seem that the kind of treatment given here is useful because it is often used, but I suspect that we could get along just as well without it, although it has served as an important item in the education of our practitioners. In the view of some it does not indicate a path to wisdom because it does not sufficiently emphasise the need for simplicity, nor is it particularly revealing of the mechanisms of Nature.

The four sections are concerned with techniques for turbulent diffusion (4 articles), pollution and diffusion in the air (4), mixing in tidal waters (4) and water pollution control (2). As might be expected there is some repetition of basic material by different authors.

R.S. Scorer

LEAD AT WORK - NEW REGULATIONS

New regulations to protect workers against exposure to lead have been laid before Parliament. The regulations, prepared by the Health & Safety Commission, will be supported by an Approved Code of Practice. The new regulations and code aim to control exposure to lead in all work places, and will replace for the most part the industry-specific requirements of the Factories Act 1961 on lead and numerous associated lead regulations. The new regulations will apply to about 10,000 people who are significantly exposed to lead in the U.K. They will require employers to assess the nature and extent of exposure to lead in the work place (guidance on action to be taken after the assessment is given in the code). Other requirements are adequate control measures and provision of respiratory protection for employees for whom control measures do not afford adequate protection against airborne lead; provision of adequate hygiene (wash-room and changing) facilities; medical surveillance of employees significantly exposed to lead; and keeping of adequate records relating to all requirements of the regulations. The regulations also seek to protect the environment by requiring employers, workforce and self-employed persons to prevent, as far as reasonably practicable, the spread of contamination by lead from places where work with lead is being carried out.

The code of practice will include a lowering of the level at which workers are temporarily suspended from work, from one hundred micrograms of lead per hundred

millilitres of blood ($100 \mu\text{g}/100\text{ml}$), to $80 \mu\text{g}/100\text{ml}$. Special provisions are made in the Code in respect of women employed in lead works in order to safeguard any developing foetus. In the submission to Parliament, the Health & Safety Commission say that "children are affected by lower levels of lead absorption than adults and, since lead in the mother's blood could cross the placental barrier and might impair the development of the central nervous system, it is considered that the foetus is vulnerable, particularly in the early stages of development". Therefore, women of reproductive capacity significantly exposed to lead at work will be suspended from work with lead when their blood lead concentrations exceed $40 \mu\text{g}/100\text{ml}$ (the upper level likely to be found in a non-occupationally exposed population). Women with confirmed pregnancies who are significantly exposed to lead at work will be suspended from work with lead to give additional protection to the foetus. The Equal Opportunities Commission was consulted about this proposition and agreed in principle to this clause in the final draft.

While the Commission realise that these new proposals will entail a considerable amount of work initially for industry, particularly those industries not covered by previous specific legislation on lead, it is emphasised that the regulations will rationalise existing legislation and improve standards. They have been designed to ensure that the cost is in proportion to the benefit and, where the risk is low, the costs will be low. Requirements for air monitoring will be more stringent with, initially, frequent monitoring on a full survey pattern, but the greatest increase in cost will probably lie in the rise in the number of workers who will be suspended from work with lead. Women employees will be suspended at fairly low levels of exposure, particularly where there is a relatively high background level of lead in the environment, in places such as Birmingham and Glasgow. The Commission points out that approximately 1,250 women are subject to existing statutory provisions and currently under medical surveillance. Of these, it is estimated that about 23% would be suspended if the blood lead level of $40 \mu\text{g}/100\text{ml}$ were to be introduced straight away. Therefore the Commission propose to delay the introduction of this level for a period of two years after regulations have been made in order to allow time for adjustment to take place. (It is proposed that, otherwise, the Regulations & Code of Practice will come into force 12 months after they have been made.)

The benefits claimed for the proposed regulations are that a more consistent approach, especially in relation to medical surveillance, should provide improved health standards resulting in less time off work, lower costs of sickness benefits, a reduction of the load on medical services and fewer common law claims. Since 1977, there have been fewer than 20 cases of notifiable lead poisoning a year but it is hoped that the new regulations with their wide scope and clear suspension level will help to reduce this number still further.

The regulations do not propose to interfere in any way with local authorities' role in monitoring environmental levels of lead, or in their control of lead in the work place, where applicable, but the importance of co-operation and good liaison between HSE, ACAI and local authorities is emphasised.

ENERGY SAVING IN PUBLIC AND COMMERCIAL BUILDINGS

by

M.G. Burbage-Atter, BSc,CEng,FInstE,MCIBs,FIPlantE,
of Heaton Energy Services, Consulting Engineers

INTRODUCTION

Ever since the events of the Autumn 1973 (the first of the major increases in crude oil prices and the consequent shortages), life has altered for most of the world's population. In the Western nations, the effects caused serious problems not even solved today. World trade has been made more difficult, tariff barriers erected and nationalism become rife. Even we, in the UK, are still reeling from the effect. Energy prices are sky high, compared to a few years ago, and it is indicative of the times that crude oil prices were raised last year (1979) by far more than in the twelve months surrounding the original event.

However the message, that energy is no longer cheap and will never be cheap again, is getting through. Efforts are being made at all levels to save energy, the reason being financial, to save money.

Local authorities and certain large commercial undertakings were quick to realise the implications on their costs of increased energy prices and took action to minimise the effect. I was privileged to become one of the first local authority energy managers, efforts pioneered by the stalwarts of Lancashire County Council who started many years before 1973. In the commercial sector, Sir Derek Rayner of Marks and Spencer fame achieved great financial savings in that shopping chain.

Prior to these times, energy conservation was virtually unheard of. Cheap coal had been supplanted by cheap oil during the 1960's to be itself supplanted by cheap gas in the early 1970's. Energy was plentiful, energy was cheap, so wastage was rampant. This all changed, virtually overnight; energy conservation became the "in" thing, "save it" was the watch word - but why "save it" - save what? Is it to conserve energy supplies for the future or to save money?

It soon became apparent that financial savings were conceived to be of greater importance; indeed, the whole fabric of Western civilisation is geared to money. Thus the conservation of energy is apparently secondary to the financial aspect.

This is surely wrong: energy conservation should surely be aimed at conserving

WORLD ENERGY RESERVES - VARIATION IN ESTIMATES

			PRESENT KNOWN		POTENTIAL FUTURE		
		Reserves	Life at 1971 Consumption Rates	Life at Future Consumption Rates	Reserves	Life at 1971 Consumption Rates	Life at Future Consumption Rates
COAL	LOWEST	130×10^3 metre	60	30	1100×10^3 metre	500	150
	HIGHEST	2200×10^3 metre	1000	190	4800×10^3 metre	2200	250
OIL	LOWEST	115×10^3 metre	32	16	360×10^3 metre	100	30
	HIGHEST	130×10^3 metre	36	18	515×10^3 metre	140	40
NATURAL GAS	LOWEST	40×10^3 metre	33	15	110×10^3 metre	90	25
	HIGHEST	60×10^3 metre	45	19	420×10^3 metre	330	40
URANIUM	LOWEST	0.9×10^6 tons		16 (Thermal)	1.3×10^6 tons		20 (Thermal)
	HIGHEST			50/100 (Breeder)	3.2×10^6 tons		50/100 (Breeder) 57 (Thermal) 50/100 (Breeder)
SHALE TAR SAND	LOWEST	140×10^3 metre	39	+9 on oil	400×10^3 metre	110	+10 on oil
	HIGHEST	170×10^3 metre	48	+11 on oil	720×10^3 metre	200	+17 on oil

TABLE 1

THE ENVIRONMENTAL RESPONSIBILITIES OF THE LOCAL AUTHORITY

One Day NSCA Teach-In — Thursday 4th December 1980
 The Normanton Inn, Clumber Park, Nr. Worksop, Nottinghamshire

Subjects: The Wider Aspect of the Responsibilities of the Local Authority
J.C.L. Burns, Director of Planning, City of Derby

Responsibilities in the Field of Air Pollution

*Roy Westerman, Assistant Chief Environmental Health Officer
 City of Nottingham*

Waste Disposal

*A.Q. Khan, Principal Toxic Waste Officer, S. Yorkshire County
 Council*

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energy supplies for the future. At the moment various individuals and committees have reported that the known reserves of fossil fuels will last for only a relatively short period. Coal is most plentiful and is likely to last to 2200 AD. Oil is being rapidly used up even at the current high prices and is likely to last until 2000. Gas is being used up in a similar fashion to oil; 1995 is the crucial date. Uranium is also likely to be in very short supply from the 1990's. Thus our finite energy supplies, the so-called fossil fuels, will run out at some time in the future, the only doubt is when. Little thought seems to have been given to energy usage in the year 2500, and even less to 5000 AD but there were people on this earth 3000 years ago so there is no reason to believe they won't be here in 3000 years time. It will not make any difference then, even if you have £1,000,000 and want a ton of fuel; if there is no fuel left, the money is no use.

GOOD HOUSEKEEPING— PHASE 1

Having established the idea that energy conservation is an urgent necessity the question then becomes one of providing the means. Unfortunately there is straight away the clash between providing the means and the potential economy. However, good house-keeping costs very little money but can be very effective, giving results of as high as 10% energy reduction and hence 10% reduction in costs.

The success of this first stage is dependant upon two factors:-

- (a) The enthusiasm of the person organising the scheme.
- (b) Active participation by other employees in carrying out and maintaining the savings achieved.

It is very easy to have an energy conservation campaign ruined by the odd person who steadfastly refuses to co-operate or even goes so far as to deliberately hinder the work. A successful public relations or awareness campaign is absolutely essential. This can be achieved by the use of posters, stickers, competitions and the like. Above all, employees must be involved and participate actively.

The areas which could be included in such activity are:—

- (a) A reduction in heating energy usage by:
 - 1. the non-use of additional heating sources, eg. fires, etc.
 - 2. better use of the boiler plant controls, time clock, thermostat etc.
 - 3. improvement in boiler plant efficiency by alterations to the burner/stoker settings.
 - 4. alterations to the heating system controls, eg. three-way valve settings, heater thermostats, etc.
 - 5. shutting the heating off in rooms where it is no longer required, but maintaining frost protection.
 - 6. shutting the doors of each room, especially doors leading to outside.
- (b) A reduction in electricity usage mainly in the field of lighting, by switching off lighting when not required plus encouragement to staff to economise in the use of

electricity by switching off machines, kitchen equipment, after use.

- (c) A reduction in domestic hot water usage by ensuring that hot water is not wasted through leaking taps or as is often the case, taps left on after use.
- (d) A reduction in overall energy wastage by seeking repairs to properties with ill-fitting windows, doors, floors and roofs, and even broken windows.
- (e) Advice to the various members of staff concerned with a view to maintaining the improvements made, ie. keeping the awareness campaign alive.

Experience has shown that attention to these items at virtually no cost to the body concerned can yield savings of a least 10% provided that the staff give the necessary whole-hearted co-operation. However efforts in this direction can be marred by the odd unco-operative person who readjusts such things as controls, or leaves doors and windows open.

- (f) A tariffs review. Experience has shown that a tariff and contracts review for all fuel may yield savings. Obviously the success of this aspect is one of financial economy and not energy economy. However, in one local authority successful negotiations resulted in lower or more stable prices for future supplies.

The estimated future savings excluding electricity tariff investigations were:-

Solid Fuel	£ 10,600 per annum
Oil	£ 64,000 per annum
Gas	£ 80,000 per annum
Total	£154,600 per annum

Further money was saved as a result of an electricity tariff investigation, amounting to some £120,000 per annum.

SMALL CAPITAL EXPENDITURE – PHASE 2

Energy savings in the second phase are those available after some capital expenditure on energy conservation schemes.

This programme might include:-

- (a) The provision of heating controls.
- (b) The provision of additional insulation.
- (c) The efficient servicing of boiler plant.
- (d) The efficient servicing of heating controls.
- (e) The testing and use of oil and solid fuel additives.
- (f) Conversion from one fuel to another.
- (g) The provision of optimum start controls.

(a) The provision of heating controls

On carrying out the detailed investigations under the first phase of an energy conservation programme, it may well become apparent that in certain properties:-

1. There is no heating system control apart from the boiler thermostat
2. There is no provision for frost protection.

Heating system controls should be provided, such as a simple internal room thermostat of the sealed type to prevent unauthorised interference, and time switches with the capability of early on and late off operation. Frost protection should take the form of an internal low limit thermostat, again of the sealed type, working in conjunction with the water circulating pump, with a further low limit thermostat in the water line to operate the boiler plant. Experience has shown that the energy consumptions of twelve local authority properties where such controls were installed gave reductions as follows:-

Fuel	No. of Properties	Consumption		Reduction	
		<i>Before</i>	<i>After</i>		
Oil	6	620 litres/day	549 litres/day	71 litres/day	11.4%
Gas	6	17,876 ft ³ /day	15,151 ft ³ /day	2,725 ft ³ /day	15.2%

The cost of the controls in these twelve properties was £1,028.00 and this cost was recovered, due to the lower energy consumption, in 119 days (4 months).

(b) The provision of additional insulation

Many Local Authority or public buildings have either little or no insulation within the roof space. Even aged person hostels which are heated by electricity may have only one inch (25mm) of roof insulation. Roof insulation should be provided where possible: 125mm thick in properties fired by gas and 150mm thick in electrically heated properties. This insulation is normally in the form of rolls for installation in the normal pitched roof building. However, for flat roof buildings, provided there is adequate space between the ceiling tiles and roof structure, insulation can be blown into the cavity to the required depth after provision has been made for a vapour barrier. The cost of this roof insulation is of the order of £1.20 to £1.50 per square metre and the estimated recovery period is normally between nine months and two and a half years.

Results to date indicate that the roof heat loss can be reduced by over 60%, equivalent to 15-20% for the whole building. Cavity wall insulation is also a possibility. However, concern has been expressed over the use of foam insulants (costing around £2.00 per square metre) as problems, allegedly due to water penetration, have occurred. There are two cavity wall insulants available, however, which have agreement certificates indicating

that water penetration is impossible. These two are blown in pelleted glass fibre (costing £2.00 per square metre) and blown in mineral wool (costing £4.00 per square metre). The use of such insulants indicates a reduction in wall heat loss of over 50% equivalent again to 15-20% for the whole building. The recovery period is normally between two and five years.

(c) The efficient servicing of boiler plant

A further result of any initial detailed property investigation may be that the combustion conditions are found to be below those that could reasonably be expected.

In one local authority, spot checks were carried out at 22 properties, with 43 boilers, all of which were oil fired. The maximum combustion efficiency found was 72% whilst the minimum was 44%, and the reason for this relatively poor performance was traced to:-

- (a) heavy scale deposits on the boiler combustion surfaces which could not be removed by brushing
- (b) smoke production by the burner accompanied by a low CO² content in the flue gases indicating oil burner problems, probably with burner nozzles having passed the end of their useful life.

An oil fired boiler specification for routine maintenance was prepared and has become standard practice for this Authority.

The Specification and Report Sheet is given in Appendix One.

Difficulty was experienced in finding competent companies who could carry out the terms of the specification. Results, however, indicated an average 7% improvement in combustion efficiency, the cost of the service per boiler being about £40.00 instead of the more usual £25.00. Typical results were:—

	As found	As left
Flue Gas CO ²	7.0%	11.0%
Flue Gas Temp	255°C (490°F)	232°C (450°F)
Air Temp	16°C (60°F)	16°C (60°F)
Smoke No.	2	1
Dry Flue Gas Loss	16.6%	9.4%
Moisture Loss	7.5%	7.4%

The improvement in combustion efficiency = 7.3%.

A similar specification to that for oil firing has been drawn up for gas fired boilers as similar poor combustion conditions were found from spot checks.

(d) The efficient servicing of heating controls

A thorough survey of all heating controls should be carried out as it is possible that a large number do not operate correctly.

An investigation was carried out into the operation of the boiler and heating plant controls at six upper schools. The heating systems used in each property were of the mixed type i.e. a fan or natural convector system utilising mixing valves and compensator, and a radiator system utilising full boiler water temperature. In addition, the domestic hot water temperature was controlled by mixing valves and compensators. In five of the three properties, time switches were provided but in one the boiler plant ran twenty four hours per day with the radiator system operating under night set back conditions during the day time with full heating at night. At the time of the investigation, all time switches, compensator and domestic hot water controls were in operable condition.

However, faults were found as follows:-

- School 1 - Both motorised shut off valves and internal boost termination thermostat inoperative.
- School 2 - One compensator out of commission owing to recurring fuse failure.
- School 3 - Compensator out of commission and remote hot water cylinder temperature control inoperative.
- School 4 - No automatic control of plant whatsoever due to the incomplete installation and wiring of components.

The cost of overhauling the existing controls in the six schools, replacing the inoperative parts and putting to work correctly was estimated at £1,330 whilst the cost of an annual service by the manufacturer was £240.

The total cost of fuel at these six schools was of the order of £100,000 and the energy consumption was reduced by 5.2% giving a saving of £5,200, indicating a cost recovery period of three months. Thus, a regular annual check of all the control systems is now being undertaken by the manufacturers in order to maintain the systems at optimum efficiency.

(e) The use of fuel additives

There are a great many companies offering fuel additives which purport to give huge savings in fuel consumptions. These claims are probably exaggerated. Experience of the use of such additives has shown:-

1. AN OIL FIRED SWIMMING BATH

The plant used some 320,000 litres of gas oil per annum.

Prior to the test, the burners were set up for the best combustion conditions obtainable,

the results being:-

	Ambient Air Temperature	Exit Flue Gas Temperature	Exit Flue Gas CO ₂ %	Smoke Number
High Fire	29°C (85°F)	321°C (610°F)	7.0%	1
Low Fire	29°C (85°F)	173°C (340°F)	8.3%	3

These results indicated a dry flue gas loss of 20.9% on high fire and 8.6% on low fire. Checks of the combustion condition with the oil additive in use have given the following results:-

	Ambient Air Temperature	Exit Flue Gas Temperature	Exit Flue Gas CO ₂ %	Smoke Number
High Fire	29°C (85°F)	272°C (520°F)	9.0%	1
Low Fire	29°C (85°F)	121°C (250°F)	9.8%	3

These results indicate a dry flue gas loss of 13.5% on high fire and 4.7% on low fire. Thus, the improvement over the original conditions is some 5.6%.

The required oil additive dosage rate was of the order of 4000: 1, thus 80 litres (18 gallons) were required, at a cost of around £2.00 per litre (£9.99 per gallon).

In those days the cost of oil was only 4.0 pence per litre (18.26p/gallon) so that the saving in fuel cost was some £720 per annum against a cost for the additive of £160, an overall saving of £560 per annum.

2. A COAL FIRED TECHNICAL COLLEGE

The boiler plant at this property comprised four Vauxhall boilers, three for low pressure hot water heating and one for low pressure steam for kitchen purposes. The annual coal consumption was of the order of 850 tons.

Firing was by Riley Direkto bunker to boiler underfeed stokers, the fuel in use being Fryston Washed Singles.

In this case, a trial was undertaken using a solid fuel additive, purported both to improve combustion conditions and keep the boiler surfaces in a clean condition.

Prior to the trial, the boilers were cleaned and combustion checks undertaken for a period of a month. The additive was used for a period of three months, the comparative results being as follows:-

	No Additive	Additive in use
Ambient Air Temperature	27°C (80°F)	27°C (80°F)
Exit Flue Gas Temperature	387°C (730°F)	329°C (622°F)
Exit Flue Gas CO ₂	7.5%	6.1%
Dry Flue Gas Loss	29.5%	30.2%

Thus, the dry flue gas losses were virtually identical and the boiler house staff indicated that there was no improvement in boiler cleanliness so that use of the additive was discontinued.

(f) Conversion from one fuel to another

Conversion from one fuel to another may not yield savings in the area of energy conservation, indeed in some cases more fuel may be used. Conversion is undertaken merely to obtain financial savings by changing from one high cost fuel to another which is cheaper, or from one cheap fuel to another which may be dearer in order to save financially overall from a reduction in other costs eg. maintenance.

1. CONVERSION FROM A HIGH COST FUEL TO A CHEAPER FUEL

Financial economies can be made by changing from a high cost fuel to a cheaper fuel. Consider the following case for conversion from oil to gas firing:-

Annual consumption of gas oil	=	138,000 litres (49,900 therms)
Oil price	=	12.17 pence per litre
Annual cost of oil	=	£16,795
The cost of conversion from oil to gas firing was	=	£6,000
Allowing for a slight reduction in efficiency, the likely annual gas consumption	=	54,000 therms
Gas price (excluding standing charge)	=	24.0 pence per therm
Annual cost of gas	=	£12,960
Possible financial saving	=	£3,835
Capital recovery period	=	18 months

Note - the estimated annual fuel consumption has increased by 4,100 therms

2. CONVERSION FROM A LOW COST FUEL TO A HIGH COST FUEL

Investigations into the cost of solid fuel fired plant may show that, in the case of both coal and coke, staff are having to spend much of their time attending to the plant and that in addition the maintenance and repair costs of coal fired plant, the underfeed stokers, are becoming excessive.

In order to reduce labour and maintenance costs to the minimum solid fuel fired plant may be converted to other fuels when the need arises.

An analysis of the fuel consumptions of six properties which were simply converted from coal usage to gas firing by the replacement of the underfeed stoker by a pressure jet gas burner, gave the following results:-

Annual coal consumption prior to conversion	=	400 tons equivalent to 112,000 therms
Annual gas consumption after conversion	=	92,420 therms
Reduction on conversion	=	19,580 therms or 17.4%

A comparison of the running cost of the two fuels showed that the reduction in consumption on conversion was matched by an equivalent increase in cost, as the 400 tons of coal would have cost £12,200 whilst the 92,420 therms of gas cost £12,477. However, the maintenance and labour cost on coal was some £5,580 per annum or 4.98 pence per therm compared to gas of £900 per annum or 0.97 pence per therm. Thus the six properties showed an overall reduction in cost of £4,400 or 24.7%.

An additional benefit was that fewer complaints of inadequate heating have been received so that human problems have been minimised.

Similar results in terms of energy consumptions have been obtained where coke fired plants have been converted to gas firing.

In this case the price of coke at £39.80 per ton (15.31 pence per therm) was higher than that of gas at 13.50 pence per therm, and whilst repair and maintenance costs on coke were similar to gas, the labour cost element on coke was higher than gas, so that the overall cost has been reduced on conversion similarly to that for coal.

3. BOILER PLANT REPLACEMENT

If the boiler itself is found to be at the end of its useful life, the boiler plant should be completely replaced by modern packaged units.

As might be expected, these packaged units operate at a much higher efficiency than the replaced boiler plant, especially as great care should be taken to ensure that the new

boiler plant is matched to the load pattern so that a constant high boiler loading is obtained. Various manufacturers offer modular units to achieve such loadings.

An analysis of the fuel consumptions of six properties, which had the coal fired boiler plant replaced by completely new boiler plant, five to gas and one to gas oil usage, gave the following results:-

Annual coal consumption prior to replacement	=	718 tons equivalent to 201,160 therms
Annual fuel consumption after replacement	=	246,470 litres of oil and 74,650 therms of gas equivalent to 163,780 therms
Reduction on replacement	=	37,380 therms or 18.5%

A comparison of the running cost between the fuels showed that a reduction of about 25% was made when the maintenance and labour elements were taken into account.

The recovery period for the capital outlay involved was very rapid in the case of a straight gas conversion, where the cost varied between £1,000 and £4,000 for the job, depending upon the necessity or otherwise of the provision of a new gas main, the recovery period being between six months to two years only.

However, the cost of replacement of the complete boiler plant varied between £4,000 and £30,000, giving a recovery period of between two years and five years.

Similar results came from the replacement of old coke fired boiler plant by new fired boiler plant. Again, the replacement of old boiler plant avoided inadequate heating which had become an increasing problem.

(g) The use of optimum start controls

Increasing use has been made of optimum start controls since their inception a few years ago.

In the past, in order to obtain maximum economy, time switches required changing not only in accordance with the general weather trend ie. getting colder until January/February then becoming warmer, but almost weekly, in accordance with sudden cold or warm fronts.

This is beyond the efforts of even the most dedicated staff so that the use of optimum start control has achieved an otherwise impossible task.

The use of such equipment should yield energy savings of the order of 15%; however, in the case of one installation, where the old oil fired boiler plant was replaced by new gas fired plant at the same time, the results of this change were as follows:-

Annual gas oil consumption	=	291,000 litres, equivalent to 105,240 therms
Annual gas consumption	=	68,780 therms
Reduction	=	36,460 therms or 34.6%

Obviously this reduction is not just due to the provision of optimum start as it is possible that the gas fired boiler is operating at a higher efficiency than the old oil fired plant. Nevertheless, the cost of the optimum start equipment at about £650 must have been recovered many times over in the reduced fuel cost which is in excess of £9,000 per annum less than with oil.

LARGE SCALE EXPENDITURE – PHASE 3

The third phase of energy conservation is perhaps the most difficult in which to achieve success. More research and greater expenditure is required.

The following items may be considered under this phase:-

- a) Complete renewal of building heating systems and boiler plant in order to optimise energy consumptions.
- (b) The use of heat recovery systems such as the heat wheel and heat pump.
- (c) Incineration as a means of heat recovery.
- (d) Building Construction.
- (e) Development of hot water heating by solar means.
- (f) The implementation of an energy audit system to forecast energy consumptions and costs and to highlight properties of high energy consumptions and costs.

(a) Complete renewal of the heating system and for the boiler plant

When the existing heating system or the boiler plant in any property becomes life expired, then obviously replacement must be made. However, in today's energy and economic climate, the opportunity should be taken to re-appraise completely the whole system so that the new system and plant can be designed with energy conservation in mind.

The coal fired boiler plant at a large college had been giving trouble with tube failures for some years. It became apparent that, before too long, further boiler tube failures would lead to boiler shut down so the opportunity was taken to redesign the whole boiler house in the summer of 1977.

The four coal fired boilers were removed and replaced by four new coal fired boilers each rated at 1.172 MW (4,000,000 Btu/Hr), fired by bunker to boiler underfeed stokers. The boilers were designed for low pressure hot water heating only, the kitchen steam usage

being met from a new steam connection from a nearby oil fired steam boiler.

The old heating system controls, motorised valves etc. were removed to be replaced by new, additional controls which were installed to minimise both fuel consumptions and the labour element.

The complete installation cost some £70,000 but the results to date have been quite startling.

The annual coal consumption of this plant has been around 850 tons per annum, and, during the period September 1976 to January 1977, 426 tons were purchased. During the similar period, September 1977 to January 1978, only 312 tons were purchased, a reduction of 114 tons. Reflected over the whole year this would indicate an annual consumption of 620 tons, a reduction of 230 tons or 27.0%. This reduction in cost terms is £7,000 per annum, indicating a capital recovery period of ten years.

(b) Heat recovery systems

Much has been published in the technical press during recent years of the effect of heat recovery by such equipment as the heat pipe, heat wheel or heat pump.

The basic idea behind such equipment is to recover as much as possible of the waste heat for re-use. Normal heat exchangers have been standard practice for many years; the advantage of these newer forms of heat recovery appearances is that they may:-

- (a) recover latent heat.
- (b) upgrade the heat recovered.

Installations using this type of equipment have been used mainly in swimming pools but there are also cases of heat recovery from shops and schools. A new sports centre recently completed in Bradford included heat recovery in the form of a heat wheel for air in the swimming pool hall and changing areas. In theory the use of this heat wheel should give energy consumptions some 20% lower than otherwise could be expected, and results to date indicate that this figure is of the right order.

Heat pumps have been used in swimming pools for some time, one of the most well the warm air systems for the Changing Rooms and the Main Pool Area were separate, each system having its own air heater battery, served from the oil fired boiler the warm air systems for the Changing Rooms and the Main Pool Area the oil fired boiler plant, the contaminated warm air being discharged to waste. On installation of the heat pump using R22 as refrigerant, heat was recovered from the warm moist air leaving the main pool area by a cooler battery. The heat recovered was then re-used to heat the fresh inlet air into the changing rooms, exhaust air from the changing rooms being diverted into the main pool area air inlet, thus reducing the amount of fresh air inlet into this area.

The approximate cost of the complete installation was around £8,000. Prior to the installation of the heat pump, the annual fuel consumptions were:-

Gas Oil	—	300,000 litres.
Electricity	—	269,000 units.

The annual fuel consumptions since the heat pump was installed have been:-

Gas Oil	—	219,000 litres.
Electricity	—	330,000 units.

Thus, oil consumption has been reduced by some 81,000 litres per annum (27%) whilst electricity consumption has increased by 61,000 units per annum (23%). The equivalent overall energy reduction is 798,700 units per annum (23%). The reduction is even greater when the consumptions are corrected for the weather factor. At the time when the heat pump was installed, the cost of oil was 6.78 pence per litre indicating a saving of £5,500 per annum; however, at the current price of 11.44 pence per litre, the saving is £9,300 per annum. Thus the capital cost has been recovered many times over, indeed the cost was recovered within eighteen months. It is believed that there is surplus capacity in the heat recovery battery which will allow for more heat to be recovered. Thus it is hoped to provide a further heater battery in the fresh air inlet to the main pool area, thus allowing the existing heater battery to be used for "topping up" only. Indeed it may even be possible to recover waste heat for pool water heating purposes.

In another local authority the use of heat pumps at three swimming pools for recovery of waste heat in the pool hall and changing room air, to heat the incoming pool hall and changing room air and pool water, is also under consideration. The likely cost of installing the heat pumps and associated duct and pipework, and the possible savings are:-

Site	Existing Total Fuel Consumptions (Therms)	Possible Reductions (Therms)	%	Financial Saving	Capital Cost	Recovery Period
Swimming Pool 1	37,200	20,800	55.9	£8,000	£18,000	2.3 years
Swimming Pool 2	146,000	71,900	49.1	£31,000	£70,000	2.3 years
Swimming Pool 3	83,600	32,600	38.9	£13,000	£43,000	3.3 years

(c) Incineration as a means of heat recovery

A common problem today facing local authorities is the disposal of domestic and trade refuse. Normally this is dumped as the cost is small, around £2.00 per tonne. However, this assumes that land will be available for such purposes and it is becoming obvious that suitable land is no longer readily available.

Various alternative ideas have been put forward for waste disposal, all apparently costing much more per tonne. Indeed incineration is said to cost £10.00 per tonne. However, even at this cost the benefit to the neighbourhood is enormous if the heat is recovered in some form of local district or block heating. Such a scheme will solve refuse disposal problems, drastically reduce pollution, conserve scarce land resources as well as providing a source of reasonably low cost heat.

Some local authorities have such projects, such as the scheme in Nottingham jointly undertaken by the National Coal Board and Nottingham District Council.

(d) Building Construction

The energy consumptions of buildings can be drastically reduced by providing insulation, which reduces the building construction 'U' value. The Building Regulations of 1965, subsequently amended in 1974, only apply to dwellings. The Electricity Council have also put forward recommendations.

At the moment the standards are:

	Building Regulations		Electricity Council Recommendations
	1965	1974	
External Wall	1.7	1.0	0.4
Roof	1.4	0.6	0.3
Floor	1.4	1.0	0.5

However, these are currently being amended; the new Section FF dealing with factories has 0.6 and 0.7 for roofs and walls.

I would recommend following standards as being good practice:-

External Wall	—	0.60 W/m ²⁰ C
Roof	—	0.45 W/m ²⁰ C
Floor	—	0.60 W/m ²⁰ C

Typical constructions which meet these specifications are given in:

Appendix 3	—	Wall
Appendix 4	—	Roofs
Appendix 5	—	Floors

Some of these constructions can also be applied to existing buildings. Remember however to provide a vapour barrier where necessary to prevent interstitial condensation. Many buildings suffer from ill fitting windows, door and holes in the timber floors, thus a cheap means of stopping draughts can yield great savings. It is estimated that the energy consumptions for heating in existing buildings could be reduced by at least 30% by the provision of adequate insulation. Indeed it is possible to reduce this consumption by 50% provided adequate funds are made available.

As an approximate guide, the cost of:-

Draught prevention is recovered in less than one year.

Roof insulation is recovered in under two years.

Cavity wall insulation is recovered in between three and five years.

(e) The use of solar energy

Some years ago, the technical press was full of advertisements for solar panels - cheap/free energy was the slogan. Extravagant claims were made indicating free domestic hot water all the year round, some even claiming that central heating could be achieved as usual. Solar panel heating is known to work in the USA, Italy, Spain and the South of France etc. Indeed positive results have been obtained in the South of England. However doubts were expressed as to the results obtainable further North.

However, various projects have been undertaken in Yorkshire, and in Bradford a council house has been equipped with a solar panel, built into the roof structure, to minimise maintenance and possible rain water in leakage problems. The panel faces due South and has a surface area of 5M^2 , the panel being divided into five sections, each 2 M high by 0.5 M wide, so that they could be installed between the roof joists. The whole panel is glazed over with single 6 mm toughened glass. The system designed is for domestic hot water heating only and is of the direct self draining type using a 360 litre domestic hot water cylinder fitted with two heating coils, one for the solar panel placed in the cylinder bottom, the other coil for "topping up" from the central heating system. (Appendix 6)

Results to date indicate that the weekly hot water demand is of the order of 900 litres (125 therms per annum).

The water temperatures achieved since installation in September 1979 are:-

Average cold water into cylinder =	12°C
Average hot water from cylinder =	65° C
Temperature from solar panel =	15°C to 30°C depending upon the weather.

Thus the panel has contributed between 6 and 34% of the hot water requirement. It is expected that over a complete year, the panel will heat at least 1/3 of the hot water demand.

(f) An energy audit system

In order to maintain the energy reductions obtained, it is essential to have some means of checking energy consumptions throughout the year, for setting energy targets and checking progress in meeting these targets.

It is possible to implement a programme involving;—

1. The forecast of the overall consumptions and financial cost during the year.
2. Energy targets based on the energy consumption in previous years, per square metre of floor area per property including a weather factor correction.
3. Current energy consumptions per square metre of floor area corrected for weather.
4. Deviations from the norm.

A typical programme gave the following results:—

Energy targets for the current year were based on the actual energy consumptions for the last financial year.

Typical examples of these are:-

Upper Schools

Number of schools	= 27
Average energy consumptions	= 391 KWh/m ² /annum
Maximum	= 704 KWh/m ² /annum
Minimum	= 232 KWh/m ² /annum

Middle Schools

Number of Schools	= 55
Average energy consumptions	= 396 KWh/m ² /annum
Maximum	= 1,017 KWh/m ² /annum
Minimum	= 208 KWh/m ² /annum

These are shown in Appendices 7 and 8.

Certain trends have become apparent:-

1. Energy consumption per square metre per annum increases the smaller the area of the school.
2. Properties with solid fuel fired boiler plant have the highest energy consumptions per square metre per annum and gas the lowest.

This programme could be further developed to include the following variables:-

1. Weather factor for the number of days the premises were open.
2. Actual number of days open per annum.
3. Actual number of hours open each day.

CONCLUSION

It is obvious that energy conservation can save money. Indeed it can save a lot of money, but our problem is more serious than that. When the fossil fuels run out, no amount of money can buy any more. If this country embarked on a serious energy conservation campaign, I believe that nationally the energy consumption could be reduced by 30%, and by 50% in providing heating for buildings.

Energy conservation is much more than just "Save It", it is an ongoing serious concern which is going to be with us for many years. The age of cheap energy will not return, at least not until well into the 21st century, if and when the breakthrough into nuclear fusion has been made.

In order for civilisation to survive it will be necessary to conserve all our natural resources of which fossil fuels are an important part and for these resources to be shared out fairly amongst the nations of the world.

Thus energy conservation is here to stay and it is up to us to do our bit and "save it", so that our children and grand-children shall have some energy to use.

APPENDIX 1 Specification for Routine Maintenance of Oil Fired Boilers

1.0 OIL BURNER ASSEMBLY

- 1.1. Replace nozzle(s).
- 1.2 Clean and reset or as necessary replace electrodes and H.T. leads.
- 1.3 Clean photoelectric cell and housing.
- 1.4 Clean flue thermostat.
- 1.5 Clean fan impellor.
- 1.6 Clean oil pump strainer.
- 1.7 Replace oil filter element.
- 1.8 Replace flexible coupling to fan drive, where required.

1.9 Lubricate motor. (where required.)

1.10 Clean combustion lead.

2.0 BOILER ASSEMBLY

2.1 Brush boiler heat exchanger surfaces (fireside only).

2.2 Deposits from 2.1 to be removed from boiler using suitable industrial vacuum cleaner.

2.3 Loose deposits in combustion chamber to be removed as in 2.1 and 2.2.

2.4 Chemical treatment — all heat transfer surfaces including combustion zone shall be treated with PAT 400 liquid using PAT pressure spray applicator equipment in accordance with the manufacturer's instructions i.e. initial treatment ratio 1.5, second and subsequent treatments 20:1 ratio.

PAT 400 liquid, hand operated spray tank (5 litre capacity) and brass extension tubes are available from Powerflame Chemicals Ltd, Hubbard House, Cannock Road, Hednesford, Staffordshire or from OBC/YHS.

3.0 BOILER/BURNER CONTROLS — ELECTRICAL

3.1 Check and test all boiler control sensing devices excluding water level controls.

3.2 Inspect all boiler control gear, terminals and connections, check contacts and fuses. Time clocks, frost stats and all heating system are excluded.

4.0 INSPECTIONS

The following to be made:

4.1 Inspect combustion chamber brickwork and boiler seals and baffles.

4.2 Inspect boiler insulations.

4.3 Inspect internal surfaces after cleaning.

4.4 Report any defects discovered during these inspections using service engineers report. (remarks sections).

5.0 COMBUSTION CHECK etc.

5.1 Test point — if not provided this shall be drilled (5/16" dia) in flue after the last heat exchange surface but before any draught break or stabilizer, i.e. before any fresh air ingress into the flue.

5.2 Fire boiler, check oil/air supply to give optimum combustion efficiency. (The highest CO₂ reading possible should be obtained subject to a maximum of 13% and to check smoke emission. The maximum permissible smoke reading is 3 on the Shell smoke scale.)

5.3 Run through "lock-out" cycle (excluded for steam plant).

5.4 Return to Chief Architect's Division (energy conservation section) two copies of service report.

Boiler Service Report (Oil Fired Plant)Building:Date:Address:Maintenance Company:Order No:Work Done:Remarks:Boiler No
(From left to right)

1

2

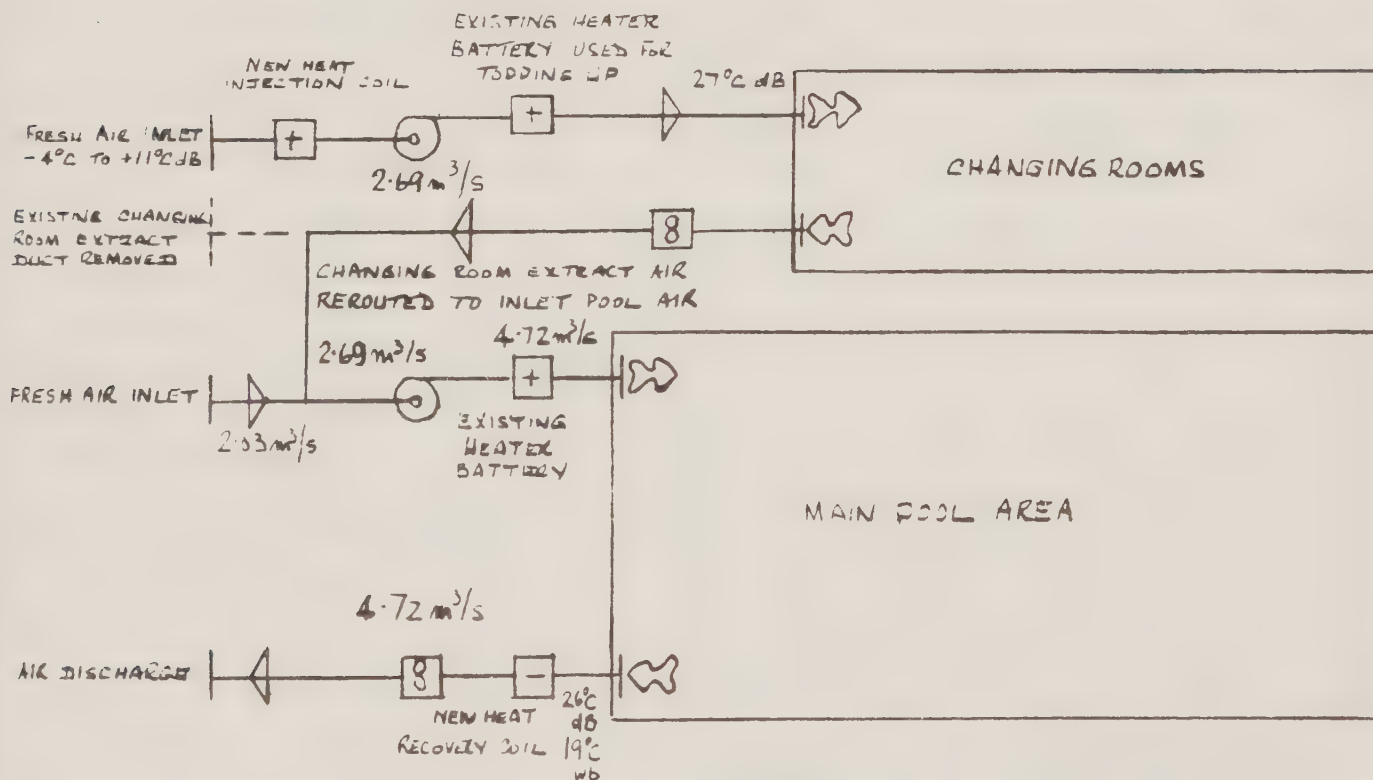
3

Boiler rating			
Make			
Burner			
Nozzles (make)			
Nozzles size in US GPH			
Nozzles angle of spray			
Nozzles spray type			
Pump pressure			
Flue gas CO ₂ %			
Flue gas temperature			
Smoke number			
Draught "w.g."			
Boiler House Ambient temperature			

Signed:

APPENDIX 2

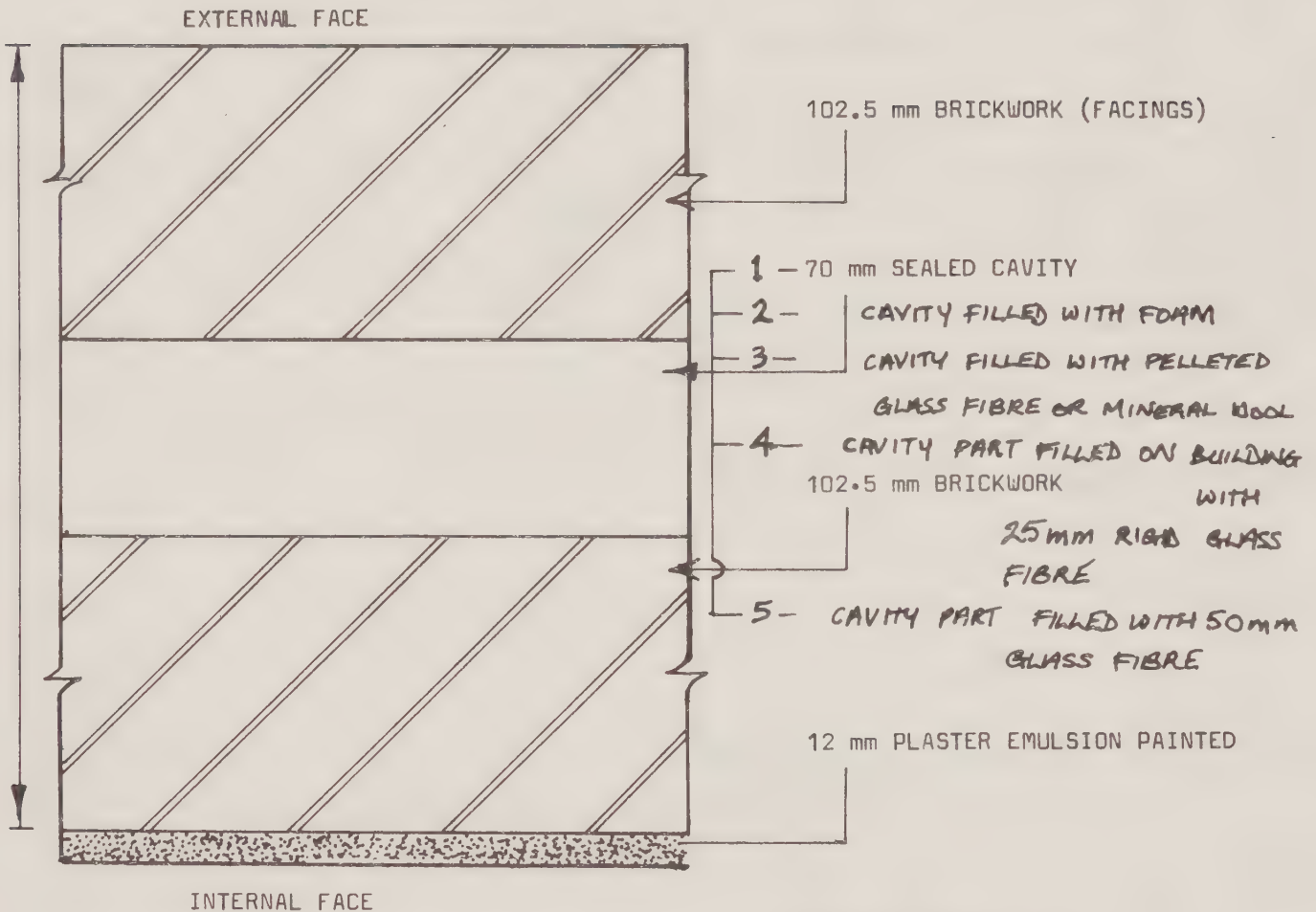
GENERAL ARRANGEMENT OF DUCTWORK



AIREVILLE SWIMMING POOL ~ SKIPTON ~ NORTH YORKS.

APPENDIX 3

WALL TYPES A + B



TYPE A:- THUS

TYPE B:- DITTO BUT 60 mm CAVITY IN LIEU OF 70 mm CAVITY

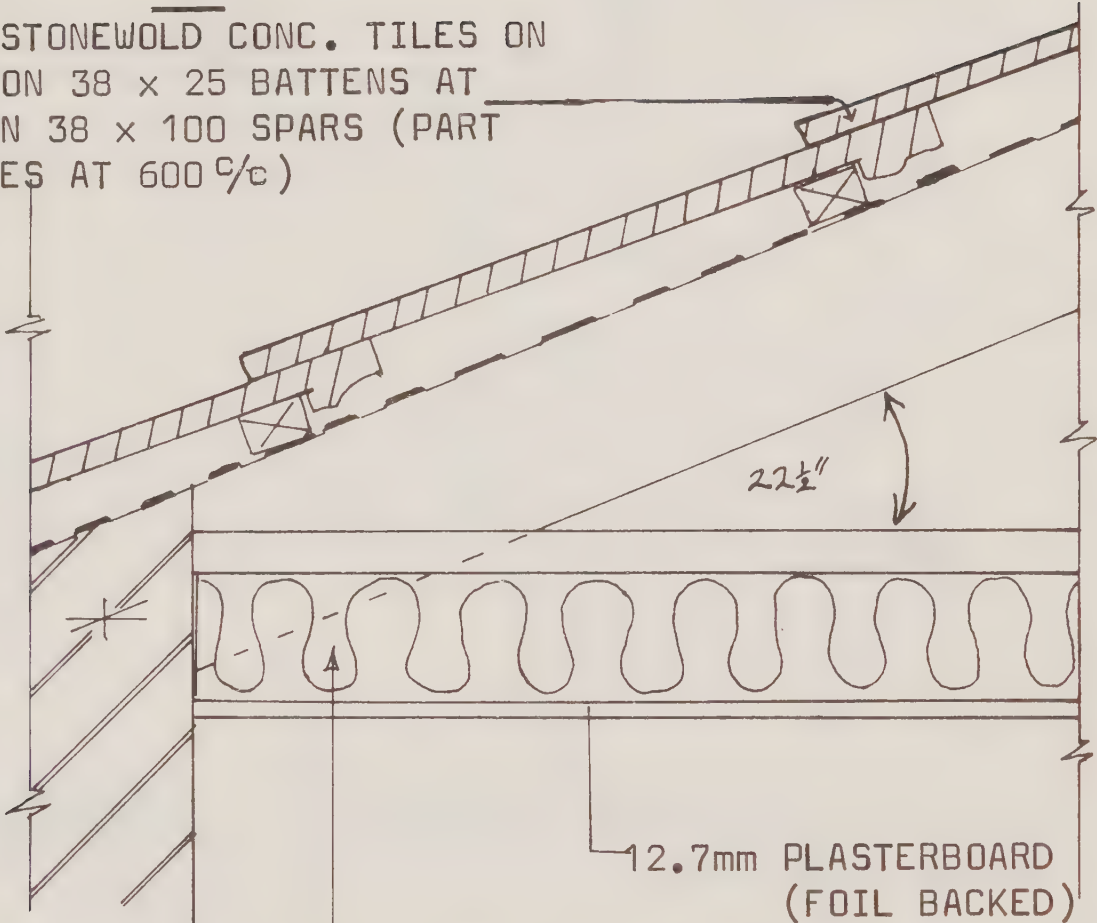
SUITABILITY : - ALL TYPES OF BUILDING

U-VALUES : - $A_1 = 1.76 \text{ W/m}^2/\text{°C}$ $A_2 + B_2 = 0.44 \text{ W/m}^2/\text{°C}$ $A_4 + A_4 = 0.67 \text{ W/m}^2/\text{°C}$
 $B_1 = 1.76 \text{ W/m}^2/\text{°C}$ $A_3 + B_3 = 0.41 \text{ W/m}^2/\text{°C}$ $A_5 + B_5 = 0.54 \text{ W/m}^2/\text{°C}$

APPENDIX 4

ROOF TYPES
J

REDLAND STONEWOLD CONC. TILES ON
SARKING ON 38 x 25 BATTENS AT
355^c/c ON 38 x 100 SPARS (PART
OF TRUSSES AT 600^c/c)



0.36

J₁

75mm GLASS FIBRE QUILT BETWEEN
JOISTS

0.31

J₂

100mm " " " "

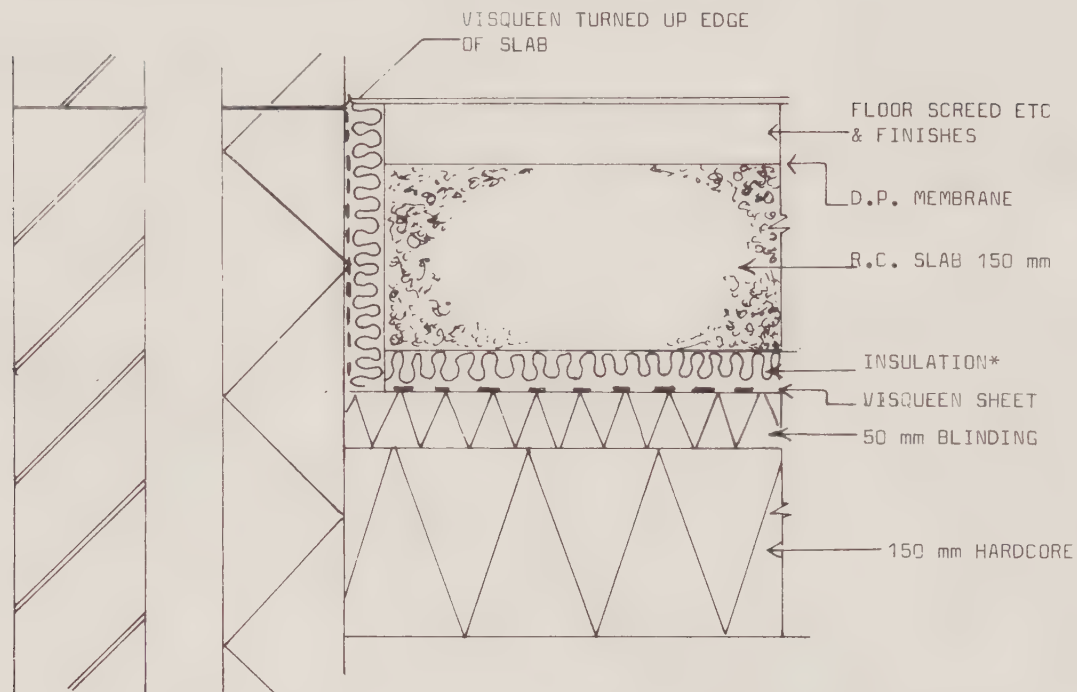
0.26

J₃

120mm " " " "

N.B. Ventilation to roof space not specifically provided

METHODS OF INSULATING - A



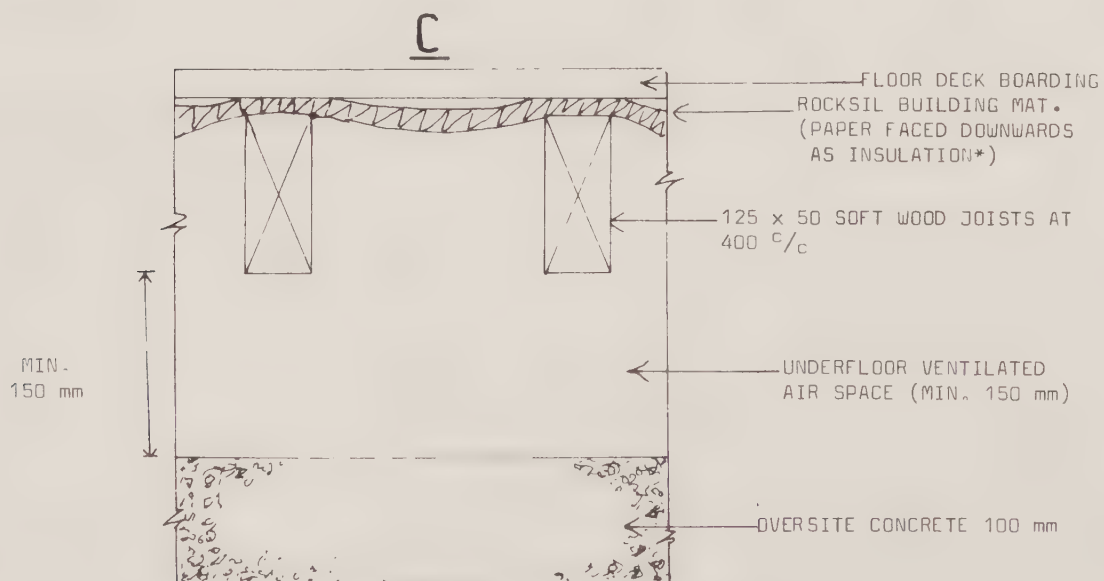
TYPICAL APPLICATION OF FLOOR INSULATION TO GROUND FLOOR (MIN. WIDTH OF INSULATION 1000 mm)

*TYPE 1 USING 50 mm S.D. GRADE EXPANDED POLYSTYRENE

*TYPE 2 USING 25 mm P.F. 96 ROCKSIL BUILDING SLABS

*TYPE 3 USING 25 mm CORK BOARD

*TYPE 4 USING 50 mm CORK BOARD



TYPICAL APPLICATION OF FLOOR INSULATION TO WHOLE OF FLOOR WITH SOFFITE EXPOSED TO UNDERFLOOR SPACE (AS TYPE 'J') & WITH SUSPENDED SOFFITE EXPOSED TO EXTERNAL AIR (AS TYPE 'M')

*TYPE 9 USING 50 mm ROCKSIL BUILDING MAT. P.F.1

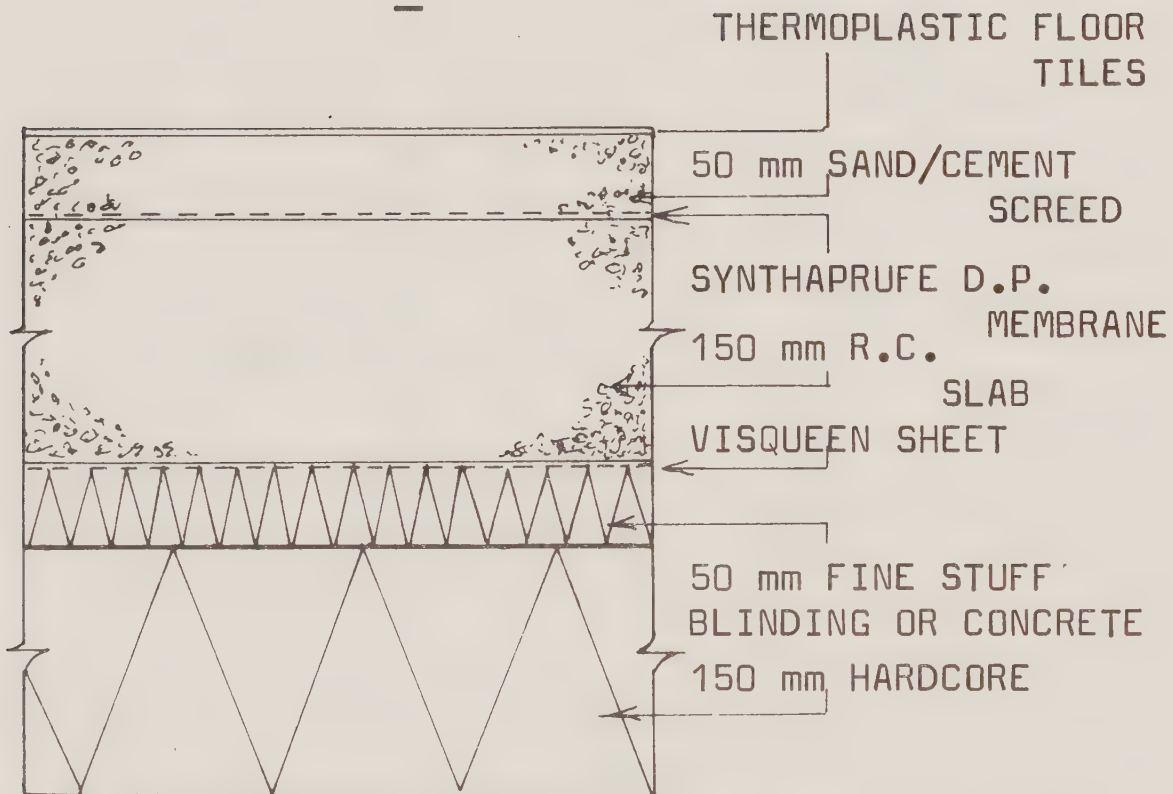
*TYPE 10 USING 75 mm ROCKSIL BUILDING MAT. P.F.1

*TYPE 11 USING 100 mm ROCKSIL BUILDING MAT. P.F.1

APPENDIX 5

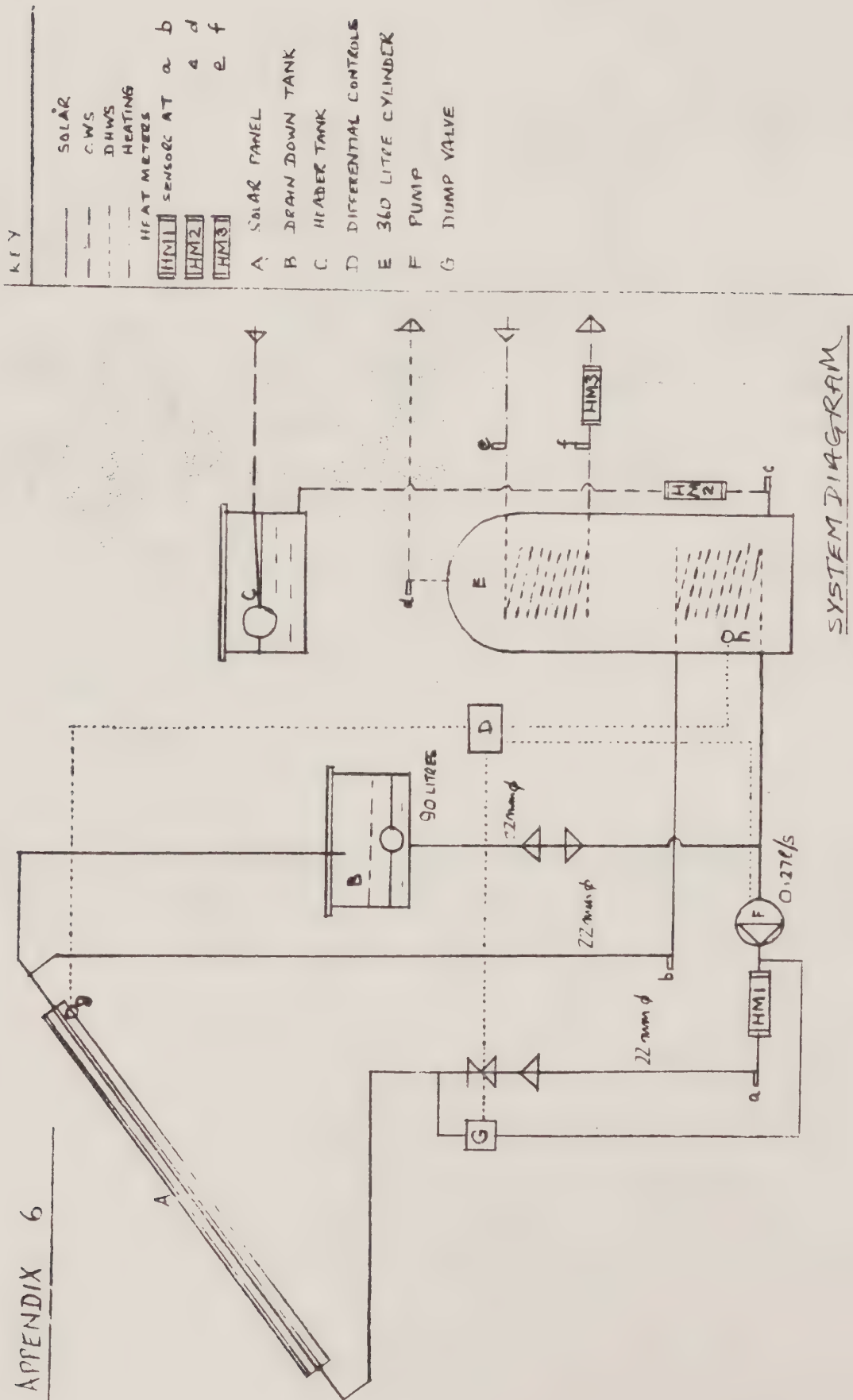
FLOOR TYPES

A



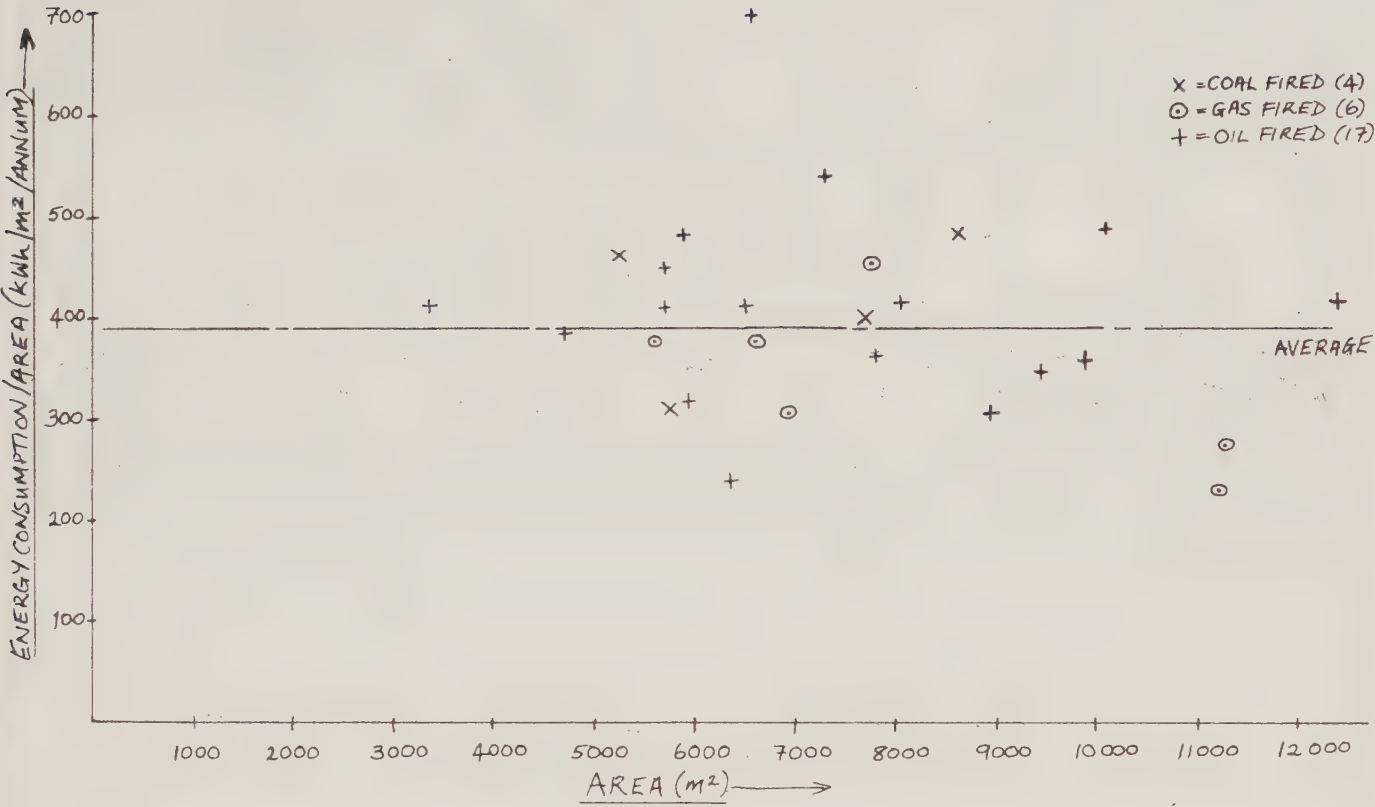
For perimeter : area ratios of ≤ 0.4
 $U = 0.6 \text{ W/m}^2/^{\circ}\text{C}$. Insulation around perimeter 1 m.
 depth allows for perimeter area ratios of ≤ 1.0

APPENDIX 6



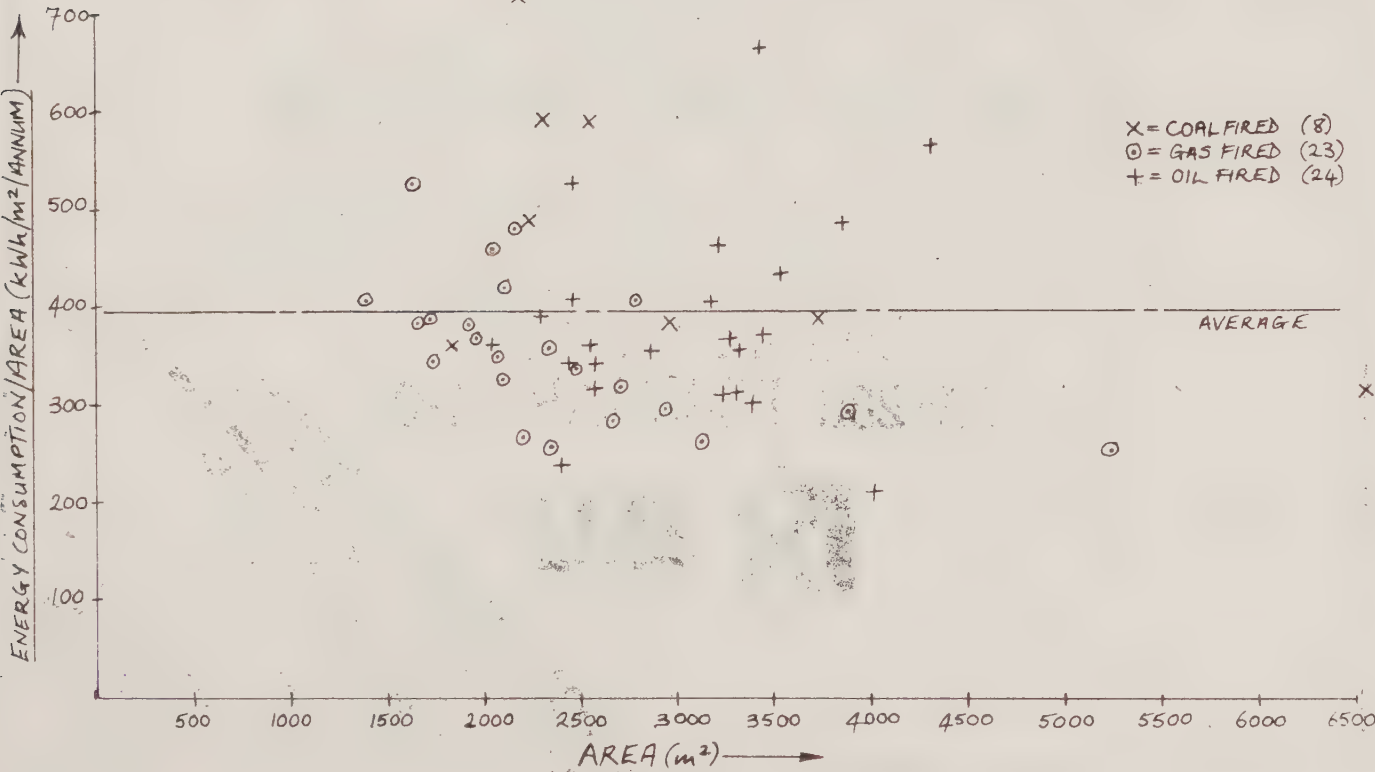
APPENDIX 7

UPPER SCHOOLS



APPENDIX 8

MIDDLE SCHOOLS



THE POLLUTION SOLUTION

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INDUSTRIAL NEWS

Environmental Impairment Insurance - New Rating System

Environmental Resources Limited has been commissioned by H Clarkson (Overseas) Limited, the London insurance brokers, to participate in the revision and updating of their pollution insurance rating system. This rating system enables the insurers to take account of the polluting characteristics of individual industries when they establish premiums for their Environmental Liability (EIL) insurance scheme.

Clarksons' EIL scheme provides cover for legal liability arising from any form of environmental impairment - by water and air emissions, by smell and noise, solid waste or 'loss of amenity' which may arise from accidental happenings as well as from 'steady-state' operations. In addition, cover is provided for the cost of litigation and for expenses incurred in removing, nullifying or cleaning up harmful substances which may have been released into the environment.

The original rating system was prepared by ERL over five years ago. It was established in the wake of a number of major pollution incidents in the late 1960s and in the context of growing concern about the quality of the environment.

ERL's new commission from Clarksons is to update the original rating system. ERL will draw on their ten years of experience in assessing environmental risks; at the same time they will attempt to identify those areas in which claims may arise in the future.

ERL's first step will be to assess the likelihood of each type of industry releasing one or more of 18 major groups of specified contaminants. ERL will then evaluate the possible extent of actionable damage which may be caused by their release. ERL's consultants have been asked to devise

a rating scheme which is forward looking. For example, particular account will be taken of the effects, notably on human health, of low concentrations of hazardous materials. It seems certain that the number of claims alleging carcinogenicity, teratogenicity and mutagenicity will grow in the future.

Dr Robin Bidwell, ERL's Research Director, comments: "Techniques to identify the presence and effects of pollutants have improved and will continue to improve. This fact, coupled with the forces of consumerism and public awareness, may be expected to result in increased claims against industry for pollution damage. Already our clients are seeing an increase in the demand for EIL insurance. Our assignment as their advisers is to ensure that premiums for such cover will be realistically calculated in the light of the most recent experience".

Reader Enquiry Service No. 8056

New Incinerator Turns Scrap Tyres Into Heat

The ECP Division of Lindemann (UK) Limited announce a new incinerator and waste heat recovery system which can turn scrap tyres into heat energy.

Environmental tests carried out in the USA have revealed that one scrap passenger car tyre can generate the same amount of energy as one gallon of oil or 160 cubic feet of natural gas and produces more than double the BTU's of wood.

By using the new ECP incinerator, tyre manufacturer's can reduce their fuel bills by using the heat from the incinerator to run a boiler, at the same time reducing the ever present problem of scrap tyre disposal. In most installations, this equipment should show a payback time of 24 months.

ECP incinerators meet all known emission/pollution control regulations and are extensively proven in the USA.

Reader Enquiry Service No. **8057**

Vast Energy Savings Offered by Factory Insulation

Vast quantities of the energy used in factory buildings are wasted because of the low priority given in the past to designing energy efficient buildings. A new booklet, published by the Department of Energy today, shows how this waste can be cut to a minimum by the proper use of insulation materials.

Industry uses over forty per cent of all the UK's energy, and a large part of this - up to a half in some industries - goes on heating buildings. There are, therefore, very substantial savings to be made in this area.

Fuel Efficiency booklet 16 'Economic thickness of insulation for existing industrial buildings' shows how waste can be reduced by the right choice of insulation for existing buildings.

The booklet comments: "New Building Regulations covering thermal insulation will ensure that new buildings, alterations and extensions, will conform to a new minimum standard. It is therefore commonsense to bring existing buildings into line with these standards, wherever possible."

The booklet sets out the information which needs to be collected to make the proper choice of insulation material and gives a simple method of calculating the economic thickness of added insulation for factory buildings.

Copies of the booklet are available from: Room 1312, Department of Energy, Thames House South, Millbank, London SW1P 4QJ.

Reader Enquiry Service No. **8058**



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Caring for the environment



The Central Electricity Generating Board has received more than 40 Commendations and Awards for environmental schemes at power stations, substations and associated nature trails and field study centres in England and Wales.

They include the Arnold Marsh Clean Air Award, two Prince of Wales Awards, four from the Business and Industry Panel for the Environment, six RICS/Times Conservation Awards and nine Wales in Bloom Awards.

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Central Electricity Generating Board

CLEAN AIR

THE JOURNAL OF THE NATIONAL SOCIETY FOR CLEAN AIR

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AU REVOIR

It is usual when writing in this way to use the editorial "we", but as this is the 49th and last editorial which I shall write for CLEAN AIR, I intend to write in the first person singular. I "came in" when the 1968 Clean Air Act was still the Clean Air Bill which sought to fill in some of the gaps left in the 1956 Clean Air Act. I leave at a time when the Government has just issued a Consultation Document on revised procedures on Smoke Control which suggest some radical changes to the old established methods, changes on which the Society will certainly make its views known.

Within the Society, urgent consideration is being given to the way ahead and the future of the Society; whether the Society should extend its remit and if so what matters its terms of reference should embrace. At the same time, the suspension of the Clean Air Council means that the important role which that body played in furthering the cause of clean air must now be assumed by the Society. Obviously it will be necessary for the Society to adapt and equip itself to deal with future problems as they arise and to be in a position to pronounce with authority on subjects of concern to the population as a whole.

Looking back over the years, it is evident that the Society has not only grown in stature but has also adapted to meet change. I therefore firmly believe that the Society is fully able to take on its new task and that it still has a very definite role to fulfil, a role which it fulfils admirably because of its wide and varied membership which provides a forum where all subjects can be honestly and thoroughly considered.

I have enjoyed my 13 years with the Society — not that they have never been contentious or frustrating, for at times they have been — and I would like to take this opportunity of thanking my many friends within the Society and a loyal and devoted staff for the immense support that they have given me during that time. In wishing you and the Society all success in the future at a time when I realise the problems of clean air and noise are becoming more complex, may I commend to you my successor Air Commodore John Langston to whom I am sure you will give all the help that you formerly gave to me. I leave confident that the future of the Society is in good hands.

P.G.S.

REPORT ON 1980 CLEAN AIR CONFERENCE

The 47th Annual Clean Air Conference was held at the Pavilion Ballroom, Bournemouth, 22-25 September, 1980. 250 delegates attended, and the general reaction seemed to be that it was a lively, thought-provoking, and broad ranging event with its debates on energy, noise, road vehicle pollution and smoke control.

Sir John Greenborough, KBE, late President and now Deputy President, CBI, delivered the Keynote Address on Monday evening (September 22nd). Sir John is a former President of the National Society for Clean Air and, in considering energy and the environment, he harked back to his Presidential Address of 1974. His theme, both then and in 1980, was that future prospects for growth in world trade and output are heavily dependent on world energy resources, for which there is an ever-increasing demand. Our ability to cope with that demand depends in turn on our ability to conserve current energy resources and put maximum effort into the development of new sources of energy. Both those factors had significant, if not conflicting, effects on the prospects for clean air in the future.



Sir John Greenborough, KBE, delivering the Keynote Address

Sir John said that energy efficiency could do much to preserve and improve the environment. Noise pollution and smoke all resulted from the inefficient use of energy. However, energy efficiency was not quite as simple as that and, following the sharp increase in the price of oil in 1973, it had taken a long time for articles to be redesigned for lower energy consumption and to be brought on to the market. From 1980 onwards, as such articles are more readily available, there should be increased progress in the pursuit of cleaner air.

The other major factor was the search by the energy industries for the development of new forms of energy. Here, Sir John's address anticipated the papers to be presented during the Energy Session on the Tuesday morning. He called for a sensible balance to be maintained, between the need to develop new sources of energy and utilise existing sources to the best advantage on the one hand, and the real requirements of the environment on the other. Obviously, he said, the battle for clean, safe and quieter air must still go on but it was necessary to get the priorities right. The preservation of the environment was an essential part of the better quality of life that all desired. But so was economic growth and that could not be sustained without adequate supplies of energy. The CBI, in a recent statement, said that members should minimise the environmental effects of their operations as a built-in part of planning, operating and financing and that they should take account of responsible conservationist groups, such as the National Society for Clean Air.

The theme of Sir John's Keynote Address was taken up by the five speakers on the Tuesday, Mr W.R. Probert for the British Gas Corporation, Mr P.B. Baxendell, CBE, for Shell Transport and Trading Limited, Sir Derek Ezra, President of the Society, for the National Coal Board, Mr G.A.W. Blackman for the Central Electricity Generating Board, and Dr Lewis Roberts for AERE, Harwell. This high level of representation from the energy industries had been arranged by Sir Derek Ezra in order that delegates to the Conference could receive the authoritative views of the various energy industries on the development of energy for the future and the environmental implications. It gave delegates an unprecedented opportunity to "have a go" at big industry and tackle the speakers on broad policy objectives as well as particular pollution problems.

The discussion was wide-ranging, covering the future supply of oil, substitute natural gas, the safety in transport and storage of radioactive waste, and future uses of coal. Delegates from South Wales were particularly interested in the future of the coal industry in that area and in the pollution from the Phurnacite plant at Aberdare, which raised the question of whether it was right that a local community should suffer for the sake of the wider community, i.e. that pollution from a smokeless fuel plant should be concentrated at point of production in order to enable consumers throughout the UK to burn smokeless fuel. Sir Derek said that this question highlighted the central theme of the energy debate which was the need to balance requirements for energy on the one hand with environmental considerations on the other. While his argument was put over with conviction, it was plain from the reaction of speakers from the floor that local concern with such a pollution problem was not likely to be answered by reference to the world energy situation.

The three papers on noise presented on the morning of Wednesday, September 24th, by Mr G. Charnley of Southampton City Council, Mr C.R. Cresswell of Newcastle-upon-Tyne City Council and Professor J.B. Large of the Institute of Sound and Vibration Research, Southampton, raised questions on vehicle noise, noise criteria, low frequency noise and noise in the community. In relation to present and forthcoming legislation, Professor Large made the point that the UK had a basis in English Common Law whereas the EEC, of which we were now members and were therefore required to adopt EEC directives on noise, formulated legislation based on the European regulatory code process.

Until there was some resolution between the common nuisance practice and the regulatory code process, there would be a perpetual conflict between our laws and the requirements of the EEC legislation.

Domestic noise and neighbourhood noise were taken up by all three speakers, and during the discussion it became clear that noise problems of that sort could be partly solved by choosing less noisy appliances and by consideration for the ears and feelings of other people. All three authors agreed that there was scope for the labelling of domestic products so that the noise output of any particular appliances could be known. They also thought that people would quickly become accustomed to using a decibel scale for assessing the relative noise output of domestic appliances.



Some of the audience at the Conference

Control of noise by local authorities, particularly in relation to planning consents, was a central theme of Mr Charnley's paper and this gave delegates the opportunity to discuss some of their own experiences in this field. Mr Cresswell's paper was essentially at the sharp end of the community's concern with noise nuisance and he made a plea for better education, particularly in the teaching of acoustics in schools which was practically non-existent.

The Wednesday afternoon session was devoted to the launching of the Society's new book, "Pollution from Road Vehicles". The editorial panel that had produced the book — Dr S.R. Craxford, Mr J.H. Boddy and Dr A.W.C. Keddie, together with Rear Admiral P.G. Sharp and Miss Jane Dunmore of the Society's staff — were asked questions from the floor about the book's content, intentions and recommendations. Mr A. Archer

President of the Environmental Health Officers' Association, and the Chairman of the Steering Committee on Environmental Lead in Birmingham, opened the discussion with a review of the problem of road vehicle pollution and, in particular, lead. Concern was expressed by several delegates about the increase of heavy traffic in this country and, in particular, the possibility of an increase in maximum lorry weights which might lead to further noise and vibration nuisance. A central question in relation to noise was the lack of enforcement of the law by the police. Speakers and delegates both agreed that the law was badly worded and simply not capable of being properly enforced at the present time. Rear Admiral Sharp asked whether it would be possible for local authorities to control noise from motor vehicles if the law were suitably revised.

The Thursday morning session, with papers from Mr Frank Haynes, MP, and Mr Paul Evans, Department of the Environment, was perhaps the most eagerly awaited by delegates from local authorities. Mr Haynes' theme was "Pollution and the Community" (people, not the European Community) and Mr Evans discussed the EC directive on air quality standards for smoke and SO₂. Local authorities who had been anxiously awaiting advice and guidance on the implementation of the EC Directive pressed Mr Evans very hard on a number of points, particularly about local authorities' rights to make their own decisions on smoke control. Mr Evans answered that, should the Local Government Planning and Land (No. 2) Bill go through, power for smoke control would be largely devolved to local authorities, with no reference to the Department of the Environment on, for example, confirmation of orders. He could not at that time say precisely how the Department of the Environment were proposing to implement the EC Directive but gave some broad hints as to how it might be done, and told the delegates that very shortly the Department of the Environment would be issuing a consultative document which would set the whole scheme out in detail. At the time of writing this report, the Consultative Document has just been issued and doubtless Local Authority Associations, as well as the National Society for Clean Air, are preparing their replies.

Mr Haynes' address was passionate and fiery and called for a return to crusading zeal in the fight for clean air. He spoke about a broad range of pollution problems with reference to complaints made to him as a District and County Councillor and now as Member of Parliament. His speech was met with enthusiasm, although several delegates questioned him closely on the point about who really had the power to improve the environment, and where the impetus would come from in times of financial stringency.

The final session of Conference was an open, question and answer session, with a panel of experts representing various air pollution interests — Frank Haynes, MP, Mr Frank Reynolds, Director of Environmental Health, Leeds City Council, Mr Paul Evans, Department of the Environment, and Mr Mike Tunnicliffe, Deputy Chief Alkali Inspector. Although traditionally the last session at Conference is the most poorly attended, the debate was lively and covered the Noise Abatement Zone Procedure under the Control of Pollution Act, the powers of local authorities under Section 222 of the Local Government Act of 1972, problems associated with opencast mining, and questions on the future and activities of the National Society for Clean Air. The Conference ended with a Vote of

Thanks by Mr R.F. Shapter, member of the Society's Council and Chairman of the London, South East and Central Southern Division.



At the Conference Cocktail Party — Mr W.B. Twyford, Deputy Chairman, Mr A.J. Clarke, Chairman, NSCA, the Mayoress and the Mayor of Bournemouth (Cllr. & Mrs E. Norman Day), Mr H. Giblin, Deputy Chairman and Mr H.I. Fuller, Immediate Past Chairman.

Social events at the Conference — the cocktail party on the Tuesday evening and the Civic Reception on the Wednesday evening — were well attended and very pleasant functions. Talks and visits were also arranged for the entertainment of the wives or husbands of delegates. While the Pavilion Ballroom was not at first glance ideal for such a conference, it provided both formal and informal seating for delegates and the acoustics were excellent, so that speakers were clearly heard by all members of the audience and the recording of the proceedings was exceedingly good. Part 2 of the proceedings, Reports of Discussions, will shortly be published. Bournemouth itself was a very popular venue and many delegates remarked on how pleasant they found the town and its facilities. Our grateful thanks go to the Mayor and Mayoress of Bournemouth and to the Bournemouth City Council for its warm welcome to the Conference.

NSCA CHANGES BANKS

Due to redevelopment in Victoria Street, London, the Society is transferring its bank accounts to Brighton. For those members who pay their subscriptions and donations by Standing Order or Credit Transfer the following details should be passed to your own bank. **The Society's bank accounts are now at the National Westminster Bank Ltd., 137 North Street, Brighton, sorting code 01-01-23 account number 0104022629.**

POLLUTION ABSTRACTS

The following papers were presented at the 47th Clean Air Conference. The papers are available from the National Society for Clean Air at 65p each, or £6.00 for a complete set (Part I, Papers, Part II, Addresses and Report of Discussions).

GAS AND THE FUTURE ENVIRONMENT Mr. W.R. Probert, Director of Sales British Gas Corporation.

British Gas operates one of the largest and most complex natural gas transmission systems in the world, supplying nearly 80% of all households in the UK, and 600,000 industrial and commercial users. The existing supply system has had to consider the environment in terms of visual impact, noise control, engineering standards and public safety. The greatest contribution which the industry can make to future environmental protection is to ensure that maximum use is made of the total transmission and distribution system, during the lifetime of natural gas reserves. Beyond that time, the plan is to distribute substitute natural gas (SNG), manufactured from a range of feedstocks, including coal. By developing techniques of environmental impact analysis and by continuing to employ current methods of environmental protection, the industry will be able to meet the growing demand for energy supply and reconcile this with concern for the environment.

OIL AND THE FUTURE ENVIRONMENT Mr. P.B. Baxendell, CBE, Chairman, Shell Transport & Trading Limited

The paper discussed the overall energy situation with all its uncertainties and related economic, social and political consequences. The first oil crisis of 1973/74 accelerated change in the structure of the world oil scene and began moves towards greater control by governments of the sources of oil production. World markets at present have ample supplies of crude oil and products as demand has fallen significantly and oil stocks are high. But oil consumers can no longer depend on oil producing countries unquestioningly to adapt their production levels to the needs of the industrialised world. Intelligent anticipation and planned forward action are essential for countries relying heavily on oil. Consuming governments are beginning to acknowledge the need to diversify energy sources, but there are still environmental and social problems involved in many major energy projects together with long lead times required for their development. The paper discusses the role of oil in the remainder of the 20th century and predicts that while sources of oil supply will change over the next 20 years, oil could still be supplying almost half the world's energy by 1990 and not far short of that amount at the turn of the century. Priorities for oil use are examined and reference made to the environmental impact of the use of oil, as fuel in particular. The work of the oil industry to set its own house in order, through such bodies as CONCAWE, is also described.

COAL AND THE FUTURE ENVIRONMENT Sir Derek Ezra, MBE, Chairman, National Coal Board

Sir Derek examines the future use of coal and the possible effects on the environ-

ment from mining and the use of coal in the U.K. He points out that the environmental disturbance associated with mining operations and the use of coal for power in the industrial and domestic sector is now considerably less significant than was the case in the period up to 1960. For the future, the total quantity of coal used for power generation and domestic and commercial heating is unlikely to change significantly over the next 20 years, while the quantity used in industry is expected to increase fourfold by 2,000. However, he predicts that the environmental effect of increased coal use in industry will not be as serious as many people fear. In towns, the increase in smoke concentrations will be small and will be counteracted by a decrease in smoke from domestic premises in gas connected areas. Sulphur dioxide concentrations may rise somewhat in industrial areas but are not expected to reach levels which would present any significant health hazard. Future uses for coal include new processes for the gasification and liquefaction of coal. These processes will be designed and constructed to reduce pollution to almost negligible levels and the products will be clean fuels. Referring to the concern expressed about trace elements, including radioactive material, released into the environment from the use of coal, Sir Derek says that these have been shown not to represent a significant possible health hazard.

ELECTRICITY AND THE FUTURE ENVIRONMENT Mr. G.A.W. Blackman, Board Member, Central Electricity Generating Board

Coal, oil and nuclear power are all used to generate electricity and the economics of electricity production is strongly influenced by the cost of the various primary fuels. Recently, the electricity supply industry has had to think very carefully about the way in which it can generate electricity in the future and the various options open to it. Environmental effects have been part of this examination. This paper discusses the way in which the electricity supply industry might progress in the future and the environmental consequences of the generation of electricity to meet public demand in the future. All fossil fuel CEGB power stations have had air pollution surveys carried out around them during the time that they entered into service since 1957. The results of these surveys are analysed and the merits of the tall stack "policy" explained. The only serious challenge to the tall stack policy has been the question of the long range drift of air pollutants and this is dealt with in detail. The paper discusses the requirements of the Alkali Inspectorate, who control emissions to atmosphere from power stations, and refers to studies of trace elements emitted from fossil fuelled power stations, and the CEGB's increasing use of risk analysis methods. Likely future developments are discussed, including forecasts of growth in electricity demand, the planning of further nuclear power stations and the future of fossil fuelled power stations in the country. Developments in technology to abate pollution are examined, including flue gas desulphurisation and other ways of reducing sulphur emissions: fluidised bed combustion, coal gasification, etc. Finally, the important question of energy conservation is considered. This can bring environmental as well as economic rewards.

NUCLEAR POWER AND THE ENVIRONMENT Dr. Lewis Roberts, Director of Harwell, UKAEA

This paper considers the present and future nuclear generating capacity. It covers the technology of nuclear generation and compares features of the nuclear power plant

with fossil fuel power stations. Detailed consideration is given to the environmental consequences of uranium use, including mining, transport, fuel and waste storage and effluents. Radiation and radiation dose and the basis for control of radiation exposure in the U.K. is explained, together with data and surveys relating to normal operation of plants and reactors in the country. The question of safety of nuclear installations, including the possibility of the occurrence of serious accidents and the transport of radioactive materials are covered, and finally consideration is given to future developments in the industry including the use of fast reactors.

ENVIRONMENTAL NOISE CRITERIA Professor J.B. Large, H.I. Flindell and J.G. Walker, Institute of Sound and Vibration Research, Southampton University

This paper describes a selection of environmental noise criteria for use by building designers, and examines the rationale behind the development of those criteria. It is considered with perceived environmental quality, and with those levels of environmental noise which cause activity disturbance, or interfere with relaxation, sleep or communication. The U.K. has had a proliferation of different noise indices and scales for use in different situations. This is not an ideal solution to the problem, especially where complex environments with noise from a number of sources have to be evaluated. There are also problems caused by the need to balance the benefits of ideal noise criterion levels against the costs of noise reduction measures.

THE ROLE OF THE LOCAL AUTHORITY IN THE CONTROL OF NOISE

Mr. G. Charnley, Environmental Health Officer, City of Southampton

This paper gives an insight into the work undertaken by local authorities in the creation of an acceptable noise environment. The author discusses the noise characteristics of modern urban life including the subjective reactions to noise which make some sounds welcome and some unwelcome. He sets the scene within which society seeks to plan for its future noise environment and to control and eliminate unnecessary noise. The role of the local authority covers strategy for planning and the assessment of the impact of noise. Highlighting the importance of planning, the author discusses the control of traffic noise and the siting of both noise emitters and noise sensitive developments. Detailed attention is given to the legislation controlling noise in the U.K., including the procedures for dealing with noise nuisance complaints. As well as their involvement in planning procedures, local authorities operate the noise sections of the Control of Pollution Act 1974 and often make their own model byelaws which control, for example, the playing of music and radios in the street. They also play a part in the enforcement of the noise provisions of the Health and Safety at Work Act 1974. The local authority role is revealed as that of engineer of the noise climate in which we all live.

COMMUNITY RESPONSE TO NOISE Mr. C.R. Cresswell, Environmental Health Officer, Newcastle upon Tyne

Colin Cresswell's paper expresses his personal observations on the response of the community to certain aspects of noise, reflecting his own experiences and opinions as a Specialist Environmental Health Officer. Noise is a subject about which people show idle curiosity but only become seriously concerned with when it affects them personally in some way. Noise is subjective, and different communities (e.g. town or country dwellers)

have a difference response to the various types of noise in the environment. Familiarity and habit breed a greater tolerance to noises which would be unacceptable in another setting. Electronic domestic equipment, including music systems, has increased the number of internal domestic noise problems, and although surveys show that less than 10% of the population are likely to be bothered by neighbours' noise, it is nevertheless the most widespread reported form of noise nuisance. Poor insulation of dwellings aggravates these problems and of course aggravates the problem of traffic noise where homes are sited near or adjacent to busy roads. The author explains the difficulties in dealing with traffic noise and proffers possible solutions. Other problems discussed are: bird scarers, burglar alarms, opencast mining, pubs and discos, railway noise, aircraft and noise at work.

THE EC DIRECTIVE ON SMOKE AND SULPHUR DIOXIDE:

THE FUTURE FOR SMOKE CONTROL Mr. Paul Evans, Department of the Environment.

This paper examines the main provisions of the European Community Directive and reproduces the text of the main articles of the Directive in Annex A. The accompanying declaratory statements are also reproduced (Annex B). One way to view the Directive is as the first air quality guideline or air quality standard to be introduced in this country. There is some flexibility over how and when it is reasonable to attempt to meet the standard but it is now law, to be implemented by each Member State. This represents a considerable change of emphasis from the present UK approach to the control of air pollution. With reference to the Fifth Report of the Royal Commission on environmental pollution, the logic behind the EC Directive and the means of implementing it in the UK are discussed. The obligations of the EC Directive are placed on national government but the only executive powers in this country are at one remove from the Department of the Environment, with the local authorities. Any necessary improvements in air quality will have to be brought about mainly through a continuation of the co-operation between local and central government, although a reserve power for the Secretary of State to require the introduction of smoke control areas does exist.

POLLUTION AND THE COMMUNITY Mr. Frank Haynes, M.P.

Frank Haynes, a long-standing NUM member and a County and District Councillor before his election as M.P. for Ashfield in May 1979, has been interested in public health and a supporter of smoke control and clean air policies for many years. He has been closely concerned with the implementation of pollution control measures in the Nottingham area as an elected representative at both local and national level; he has been able to gauge the public reaction to pollution and pollution control policies through local surgeries and complaints and comments made to him by the people he represents. His paper presents an informed and personal view of changes and improvements made over the years. He identifies problems about which more should be done and about which people are principally concerned and highlights some of the most common (and often intractable) problems about which complaints are made. Among the subjects discussed are noise, smoke control, bonfires, and the development of industrial sites.

TRANSFRONTIER POLLUTION

by

Michael Gittins, CEng., MEHA, MInstE, MRSH, MIOA

Transfrontier pollution is a relatively recent phenomenon. Evidence was put forward by Swedish authorities in the late 1960s which claimed that there had been an overall increase in acidity in precipitation in Scandinavia and Central Europe. Their conclusion was based on the study of results from a network of some one hundred monitoring stations located throughout Europe.

Rain and snowfall was collected on a monthly basis and analysed for sodium, potassium, calcium, magnesium, nitrates, ammonia, carbon, sulphate, carbonate, electro-conductivity, pH and various isotopes. Air samples were also collected over similar periods and analysed for sodium, potassium, calcium, magnesium, ammonia, chlorine and sulphur dioxide. (It should be remembered that this was before the days when heavy metals assumed environmental pre-eminence).

One of the early conclusions of this work was the identification of a gradual increase in acidity over Europe — a trend which was not apparent in Great Britain or Ireland. The source of this increased acidity was rightly attributed to atmospheric sulphur dioxide. But the question which was not answered by either that or any subsequent study was the relative contributions from local and distant sources. In the absence of clear evidence some workers attributed the source of the increased acidity in Scandinavian rain to the dispersion achieved by the tall chimney policy, as adopted in the UK. The result of the increased acidity which reduced pH in rain and snow was seen in adverse effects on forest productivity, surface water quality and fresh water fisheries.

Soil acidification is said to cause most of the problems to land set aside for afforestation because of leachate of calcium and other cations. Such leachate becomes significant if the pH falls below 5.5. It is therefore common agricultural practice to dress land with lime to maintain soil pH above 6.0. For practical reasons such partial neutralisation is not a viable proposition in areas of forestry.

Acid precipitation is said to have contributed to a real decline (about 0.5% per year) in productivity of conifers in Southern Sweden over the last two decades and similar claims have been made by Norwegian workers. Whilst data on tree production have not been challenged, the attribution of this downward trend to air pollution has been questioned. Forest production is also influenced by long term climate conditions and other natural environmental effects. There is a clear need for further work on this subject. Unfortunately this type of investigation does not lend itself to short-time studies because of the number of variables.

If rain is becoming increasingly acid then so will streams, rivers and lakes. Reductions in the pH of Norwegian surface water over a number of years is reported as being of the order of 0.3 to 0.5 units pH. There is ample evidence that fish do less well in acid waters

than those in alkaline conditions. Similarly, if the pH falls below 6.2 the diversity of invertibrate species will be reduced. Fish kills have been reported in Scandinavia where water from snow-melts caused the pH to fall below 4.6. Little is known about the effects of pH on freshwater plants.

The Department of the Environment and the National Environmental Research Council considered the available evidence in 1976 and identified areas for further research. Such work is likely to be an extremely long-term exercise. In the meantime the UK, with its many tall stacks, is being regarded as one of the main sources of the problem.

In the light of the above, the Central Electricity Generating Board has decided to study the dispersion of the plume from one of their power stations. Funding is shared between the CEGB and the Electricity Power Research Institute (USA). Some one million pounds has been allocated for this project which is being undertaken by the Central Electricity Research Laboratory.

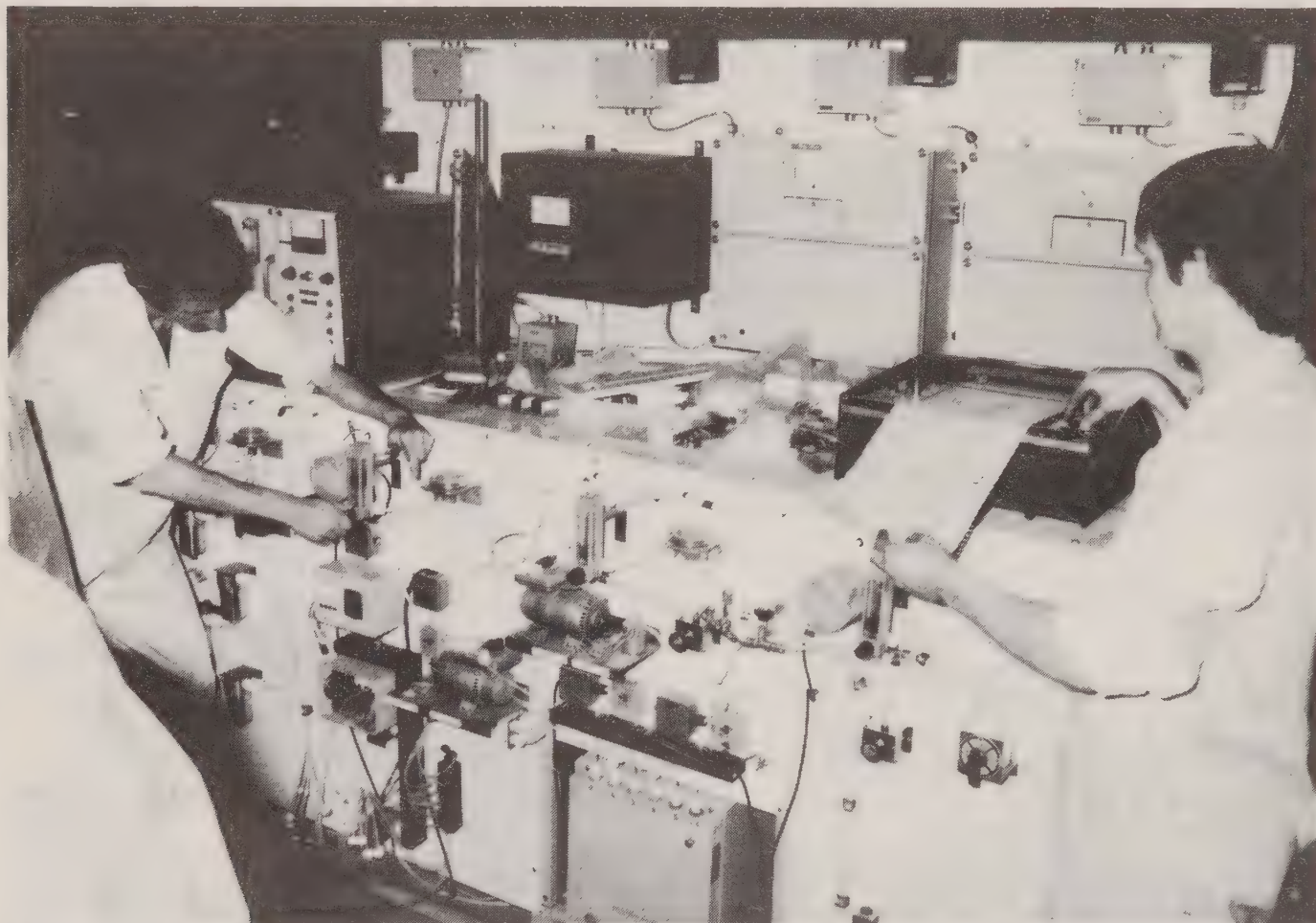


The Hercules, adapted as a flying laboratory

Essentially the plan is to follow the plume from the chimney of a power station. Measurements will be made of the chemical changes that occur in the atmosphere over a period of several days. This is to be achieved by chemically marking the plume and tracking it by a series of aircraft flights. Eggborough power station, North Yorkshire, has been selected as a typical 2000 MW station. Being nearer the coast it is hoped that it will be possible to distinguish its plume from emissions produced by other stations in the region.

Two aircraft are available, a Hercules from the Meteorological Research Flight and a Handley-Page 'Jetstream' owned by the Cranfield Institute of Technology. Both are equipped with instrumentation to record a wide range of meteorological data with additional equipment for this exercise.

Sulphur hexafluoride has been selected as the main marking gas. This is a colourless gas of low toxicity (tolerance, 1000 ppm in air). It is injected into the base of the stack at a rate of 50 kg/hr. After dilution by products of combustion it is discharged at a concentration of about 4 ppm from the top of the 200 metre stack. Following the plume is not quite such a difficult task as it sounds. Sulphur hexafluoride can be detected down to the ambient level of 0.5 parts in 10^{12} using instrumentation refined by staff at CERL.



Monitoring equipment at the stack, Eggborough Power Station

A second organic perfluoride is injected in a short burst at a similar concentration in the early stages of each exercise. It will provide a readily detectable reference point which will facilitate the measurement of the rate of movement of the plume.

The flying laboratories will carry out continuous measurement of sulphur dioxide, ozone, ammonia and oxides of nitrogen. They will collect samples of cloud water and particulates for further analysis. Almost all of the equipment used in this project has had to be completely rebuilt and adapted to enable very accurate measurements to be made in flight. Development work has overcome the problems caused by vibration and monitoring at reduced atmospheric pressure.

Measurements should be finished by the end of December 1980 and a comprehensive report on this aspect of the acid rain problem should be in the hands of the co-sponsors by mid 1981. At this stage it is not known if all of the information will be available to a wider audience.

CONFERENCES AND FORTHCOMING EVENTS

COURSES AND CONFERENCES

22 January 1981 Short Course on Environmental Assessment and Impact Analysis North East Surrey College of Technology. Course runs for eleven consecutive weeks, on Thursday evenings, from 6.00 pm until 9.00 pm.

Fee: £48 per student, payable at the College on 1st day of attendance.

Details: W.L. Colledge, Esq., Dept. of Construction Studies, North East Surrey College of Technology, Reigate Road, Ewell, Surrey KT17 3DS. Tel: 01-394 1731.

2 – 5 February 1981 Noise and Safety at Work. Course. Centre for Extension Studies, Loughborough University. Industrial noise, legislation, hearing damage. Practical work and problem solving sessions.

Fee: £225.00 inclusive of accommodation and course material.

Details: Centre for Extension Studies, Loughborough University, Loughborough, Leics. LE11 3TU. Tel: 0509 63177 ext. 249.

5 – 10 April 1981 Toxic Wastes and Chemical Effluents. Course. Centre for Extension Studies, Loughborough University.

Fee: £325.00 inclusive.

Details: As above.

11 – 12 June 1981 Symposium on International Environmental Law. Stichting Reinwater/ University of Amsterdam, The Netherlands. High level symposium with presentations on transnational pollution; aims to draft recommendations on future domestic and international legislation to control pollution.

Fee: Nfl. 125 – inclusive of lunch and refreshments.

Details: Stichting Reinwater, Damrak 37, 1012 LK Amsterdam.

CALL FOR PAPERS

1981 International Conference on Residential Solid Fuels – Environmental Impacts and Solutions. Portland, Oregon, USA – sponsored by Oregon Graduate Centre.

Original papers on the environmental and health impacts of emissions from the combustion of residential solid fuels such as wood, coal and processed fuels, and engineering and regulatory approaches to minimise environmental impacts while allowing continued expansion of this industry.

Title and abstract (about 200 words) as soon as possible, but no later than January 10, 1981 to:

Dr John A. Cooper, General Chairman – 1981 International Conference on Residential Solid Fuels – Oregon Graduate Center – 19600 N.W. Walker Road – Beaverton, Oregon 97006 USA.

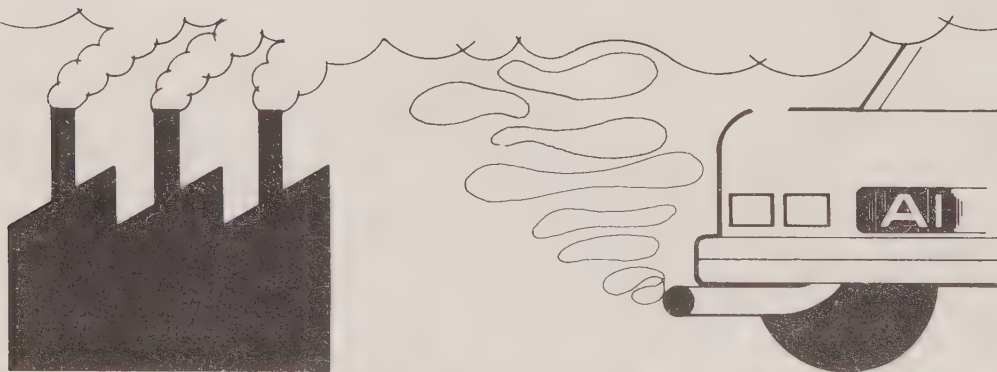
Further details from: Jane Dunmore, National Society for Clean Air, Brighton, UK.

BRIGHTON CENTRE

In conjunction with the National Society for
Clean Air Conference

APEX

Air Pollution Equipment & Services Exhibition

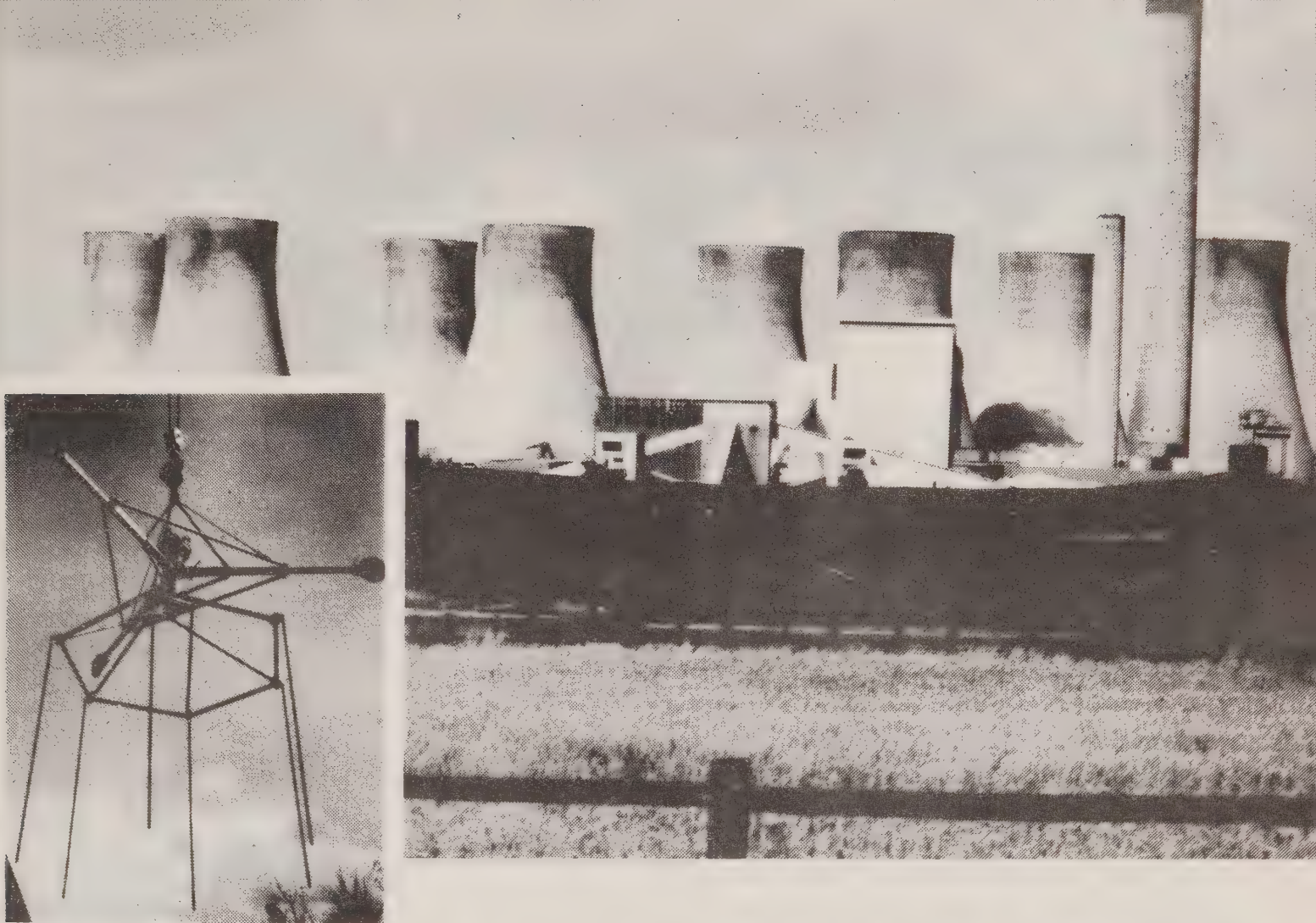


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AN INVESTIGATION OF AIR QUALITY STANDARD, MEASUREMENT METHODS AND AIR POLLUTION OF AMBIENT PARTICULATE MATTER IN SIX COUNTRIES

by

Kazuo Asakura and Hiroshi Shikata,

*Atmospheric Environmental Department, Energy & Environmental Laboratory,
Central Research Institute of Electric Power Industry, Japan*

OBJECTIVES

Suspended particulates are defined in Japan as airborne particles less than 10 microns in diameter. Air quality standards for suspended particulates were established in 1972 as follows:

- (1) Hourly value 0.20 mg/m³
- (2) Daily average of
hourly values 0.10 mg/m³

Both the low volume method and light scattering method are used to measure ambient concentrations of suspended particulates by air surveillance networks in Japan. It has been reported that the percentage of monitoring stations meeting the air quality standard (0.10 mg/m³) is fairly low. However, there are several problematic points with regard to this report.

- (1) The results obtained by the widely-used light scattering samplers are often inconsistent with the results from the low volume samplers.
- (2) The contribution of natural or artificial emissions to the ambient suspended particulate concentrations is unclear.

Thus, the present status of suspended particulates and emission control by governments in six countries was investigated. This paper describes air quality standards, measurement methods, the present status of air pollution and emission standards for suspended particulates in these countries.

RESULTS

A. Air Quality Standards

(1) The particles which are the object of air quality standards are generally total suspended particulates (TSP; particles between 0.1 and 100 microns in diameter). Particles less than 10 microns in diameter are the object of air quality standards only in Japan and West Germany.

(2) Air quality standards for suspended particulates are usually stated in terms of annual mean and daily mean values. Few standards are stated in terms of hourly mean values.

Daily mean standards for suspended particulates in foreign countries range from 1.2 to 4.0 times higher than those in force in Japan (Fig.1, Table 1). Japanese standards, however,

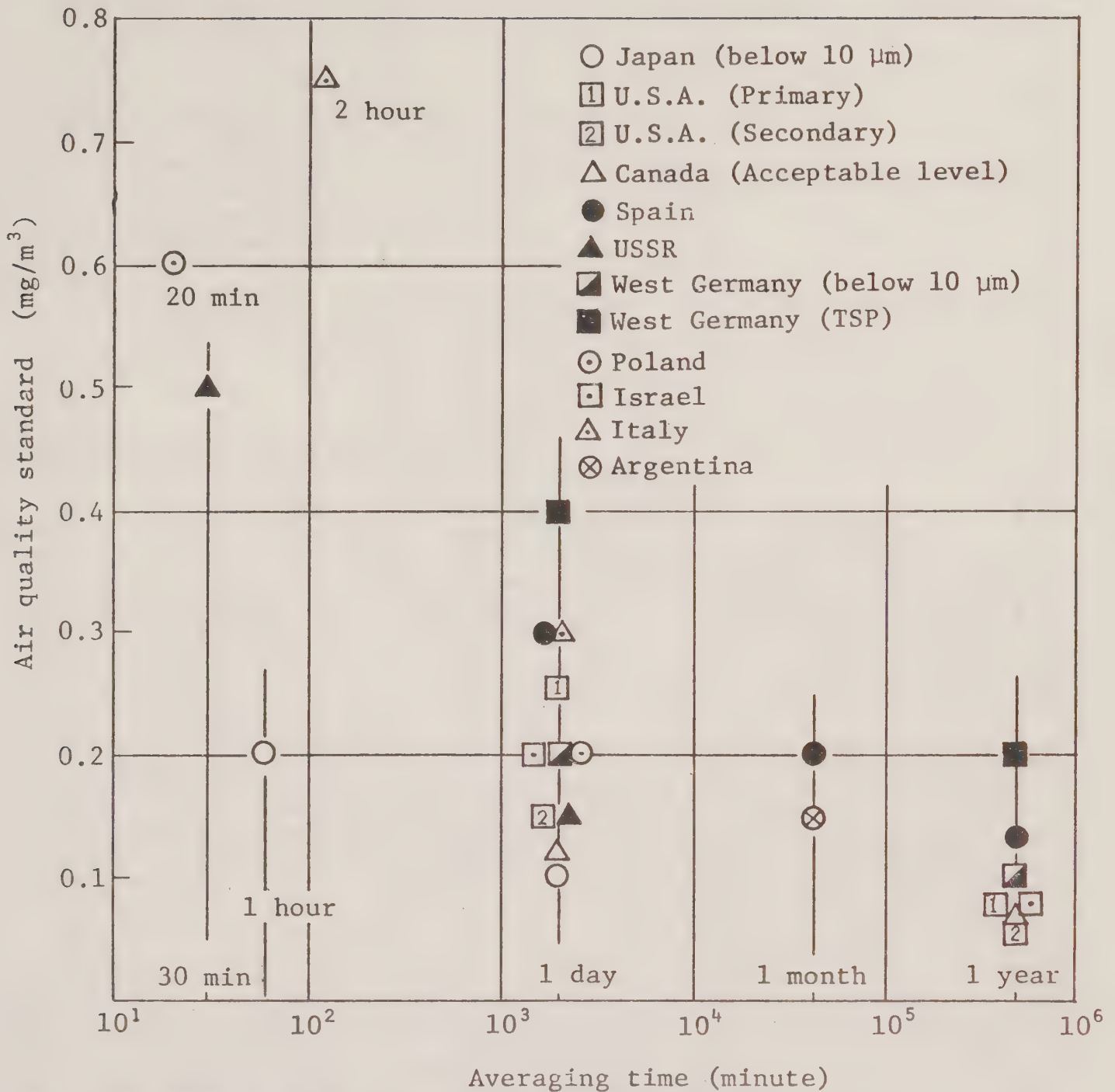


Fig. 1. Air quality standards for suspended particulates in various countries.

assume the use of the low volume sampler to monitor particles below 10 microns in diameter.

(3) Air quality standards have been established based on air quality criteria as set by the authorities in each country.

(4) The U.S. Environmental Protection Agency is now reviewing the scientific evidence for TSP air quality standards. It is planned to establish size-specific standards for inhalable particles (less than 15 microns in diameter) and fine particles (less than 2.5 microns in diameter) by December, 1980.

B. Measurement Methods and Monitoring Status

(1) The measured values by the light scattering method widely used in Japan depend

Country	Japan	U. S. A.	
<p>Air quality standard</p> <p>(mg/m³)</p> <p>[Established Year, Month]</p>	<p>Particles below 10 microns</p> <p>0.1 (Daily mean)</p> <p>0.2 (Hourly mean)</p> <p>[1972. 1]</p>	<p>Primary standard</p> <p>0.075 (ACM)</p> <p>0.26 (Daily mean)</p> <p>Secondary standard</p> <p>0.06 (ACM)</p> <p>0.15 (Daily mean)</p> <p>[1971. 4]</p>	<p>Maximum d</p> <p>0.06 (AC</p> <p>Maximum s</p> <p>level</p> <p>0.07 (AC</p> <p>0.12 (Da</p> <p>Maximum t</p> <p>0.40 (Da</p> <p>[1</p>
<p>Legal measurement method</p> <p>[Standard]</p>	<p>Low volume method or light scattering method yielding values having a liner relation with the values of the above method.</p> <p>[JIS B 7954]</p>	<p>High volume method</p> <p>[ASTM D 2009]</p>	<p>High volu</p> <p>[Report I</p>
<p>Number of monitoring stations</p> <p>(Sampler)</p> <p>[Year]</p>	<p>201 (Low volume sampler and digital dust sampler)</p> <p>1184 (Digital dust sampler)</p> <p>[1978]</p>	<p>4008 (EPA High volume sampler)</p> <p>[1977]</p>	<p>120 (EPA sam</p>
<p>Sampling time</p>	<p>Low volume sampler</p> <p>24, 48, or 72 hours.</p> <p>Digital dust sampler</p> <p>continuous throughout the year.</p>	<p>24 hours.</p> <p>Midnight to midnight.</p> <p>Every 6th day.</p>	<p>24 hours</p> <p>Midnight</p> <p>Every 6t</p>
<p>Problems and future trend of measurement methods.</p>	<p>There is not always fixed spatial and temporal correlation between the light scattering method and the low volume method.</p> <p>Piezobalance measurement and β-ray absorption measurement for monitoring sampler are being developed.</p>	<p>The sample obtained by the high volume method can be greatly affected by wind-blown dust containing relatively large particles.</p> <p>The high volume sampler in conjunction with a inlet and the Dichthomas sampler are being developed.</p> <p>An inlet having a cut-off point independent of wind velocity is being studied.</p>	<p>The main operator following recommended vibration</p> <p>Same as</p> <p>The Dich and β-ray measurement being de</p>

	West Germany	U. K.	France
<p>able level</p> <p>table</p> <p>mean)</p> <p>able level</p> <p>mean)</p> <p>[5]</p>	<p>Particles below 10 microns</p> <p>0.1 (AAM)</p> <p>0.2 (Daily mean)</p> <p>Total suspended particulates</p> <p>0.2 (AAM)</p> <p>0.4 (Daily mean)</p> <p>[1974. 8]</p>	<p>Scheduled to be established.</p>	<p>Not established.</p>
<p>ethod</p> <p>-AP-73-2]</p>	<p>High volume method</p> <p>[VDI 2463]</p>	<p>None</p> <p>[BS 1747]</p>	<p>None</p> <p>[NF-X-005]</p>
<p>volume</p> <p>]</p>	<p>78 (LIB High volume sampler)</p> <p>56 (β-ray absorption sampler)</p> <p>7 (Smoke sampler)</p>	<p>1220 (BS Smoke sampler)</p>	<p>From 100 to 200, sponsored by various organizations. Smoke sampler, β-ray absorption sampler and gravimetric method are used.</p>
<p>idnight.</p> <p>.</p>	<p>LIB High volume sampler</p> <p>24 hours, periodically about 3 days a week.</p> <p>β-ray absorption sampler</p> <p>Continuous throughout the year.</p>	<p>24 hours.</p> <p>Every day throughout the year.</p>	<p>Some stations are continuously operating, others operate only a few weeks or months. The sampling time depends upon the method used and pollution level.</p>
<p>lem is</p> <p>igence in</p> <p>rec-</p> <p>ine cal-</p> <p>dule.</p> <p>.</p> <p>s sampler</p> <p>orption</p> <p>re also</p> <p>ed.</p>	<p>A modified reference method using a low volume sampling, modified LIB high volume sampler (compact sampler), an automatic filter-changing dust sampler are being developed.</p>	<p>The relation between collection efficiency and wind velocity, particles sticking to the walls of the inlet tubing, etc. are being studied.</p>	<p>The method recommended by the public authorities is β-ray absorption.</p> <p>A new method based on a quartz crystal balance is under development.</p>

Table 1. Air quality standards, measurement methods and monitoring status of suspended particulates in six countries.

Country	Air quality standard			Attainment ratio (%)	Year
	Nature		Concentration (mg/m ³)		
Japan	Daily mean		0.10 ⁽¹⁾	22.4 ⁽¹⁾	1978
U.S.A.	Annual geometric mean	Primary	0.075	82.8	1977
		Secondary	0.06	60.4	
	Daily mean	Primary	0.26	92.2	
		Secondary	0.15	64.5	
Canada	Annual geometric mean	Acceptable	0.07	72.6	1978
		Desirable	0.06	55.8	
	Daily mean	Tolerable	0.40	93.7	
		Acceptable	0.12	23.2	

Table 2. Attainment ratio of air quality standards for suspended particulates.

Note (1). As the nature of air quality standards and the measurement method in Japan are different from those in other countries, this attainment ratio does not necessarily represent the pollution level of suspended particulates in Japan.

upon the optical characteristics of the particles (particle size, shape, refractive index, etc.). Therefore, there are no fixed spatial and temporal correlations between the light scattering method and the low volume method.

(2) In many countries but not in Japan, the gravimetric method (the high or low volume method) or the filter soiling method is used to monitor suspended particulate concentrations. The measurement methods standards are defined in detail in the countries studied.

(3) Since size selection is not used in conjunction with the high volume method, the sampler obtained by the high volume method can be greatly affected by wind-blown dust containing relatively large particles. In the U.S., the use of high volume samplers with an inlet and Dichotomas samplers to collect particles below 15 microns is being studied.

(4) The monitoring status (number of monitoring stations, sampler, sampling time, etc.) in various countries for ambient suspended particulates is shown in Table 1.

C. Present Status of Pollution

(1) The measured values of ambient suspended particulate concentrations are reported in annual summaries in many countries. It is very difficult to compare those values because of different measurement methods.

- (2) The background concentration due to natural emission sources is reported to be between 20 and 40 $\mu\text{g}/\text{m}^3$ from the high volume method data of the countries studied. The characteristics of background concentrations should be clarified in the near future.
- (3) It was reported that the attainment ratio in meeting air quality standards in Japan is lower than in the U.S. or Canada, as indicated in Table 2. The reasons, however, are unclear.

D. Emission Standards

- (1) Emission standards for total particulate matter in effluent gas from stationary combustion sources have been established in detail in several foreign countries. There has been no revision of these standards due to the recent energy situation.
-

TIMELY WORKSHOP ON THE FUTURE OF MONITORING

The Standing Conference of Co-operating Bodies met on 1st December to discuss the future of the National Survey of Air Pollution. Major changes proposed by Warren Spring Laboratory and the Department of the Environment will take effect within the next two years, and while the details have not yet been worked out, it is expected that the number of monitoring sites will be reduced, from the current level of about 1,200, to 150 sites. There will be consultation with local authorities over which sites should be retained and local authorities may if they wish put up a case for particular sites to be included in the future survey pattern. In addition, *ad hoc* monitoring will be planned to meet the objectives of, for example, the EC Directive on Smoke and SO_2 (AQ Standards). The sites proposed for the future monitoring pattern are in urban areas and will, WSL say, enable relative changes in urban smoke and SO_2 for the UK as a whole to be monitored with an acceptable degree of accuracy. Obviously, however, interpretation of results will be of major importance in the future. Thus, the forthcoming NSCA Workshop, "Monitoring - Where Next?" is very timely. Dr. Leslie Reed, who will be leading the Air Pollution Monitoring Management Group, and Dr. Keddie from Warren Spring, will both be speaking at the Workshop and the interpretation of results will be a major subject for discussion.

Registration forms for the Workshop, to be held April 8 and 9, 1981, at the University of Newcastle upon Tyne, may be obtained from the National Society for Clean Air, Brighton.

Reader Enquiry Service No. 8067

BOOK REVIEW

McCrone Particle Atlas, Edition Two, Vol. VI. *Ann Arbor Science Pub. Inc, distributed by John Wiley & Sons Ltd., Chichester, 1980. £50.00.*

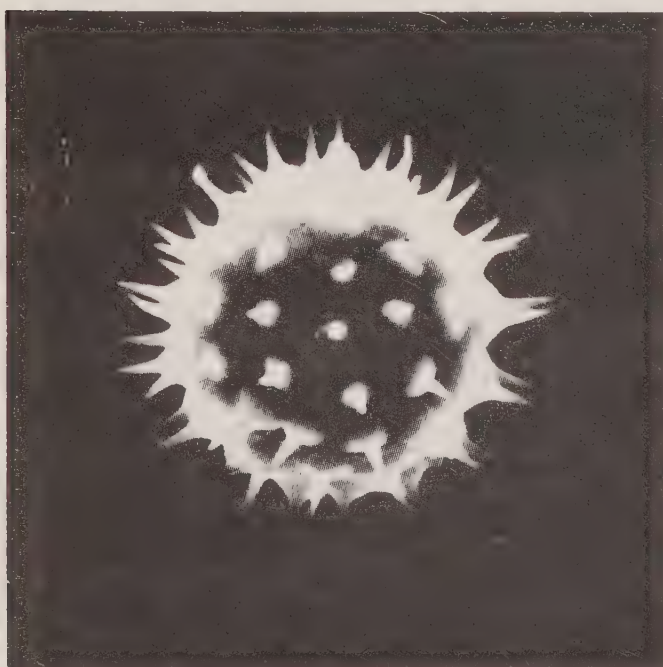
Earlier this year (1980) Volume V of the Particle Atlas was reviewed. This was an enjoyable task as can be seen by the comments in *Clean Air*, Vol. 10 No. 4.

Volume VI, the latest in the series, is almost a repeat of Volume V evidence from TRANSMISSION ELECTRON MICROSCOPE and SCANNING ELECTRON MICROSCOPE techniques. Comparison of the two volumes clearly demonstrates the image

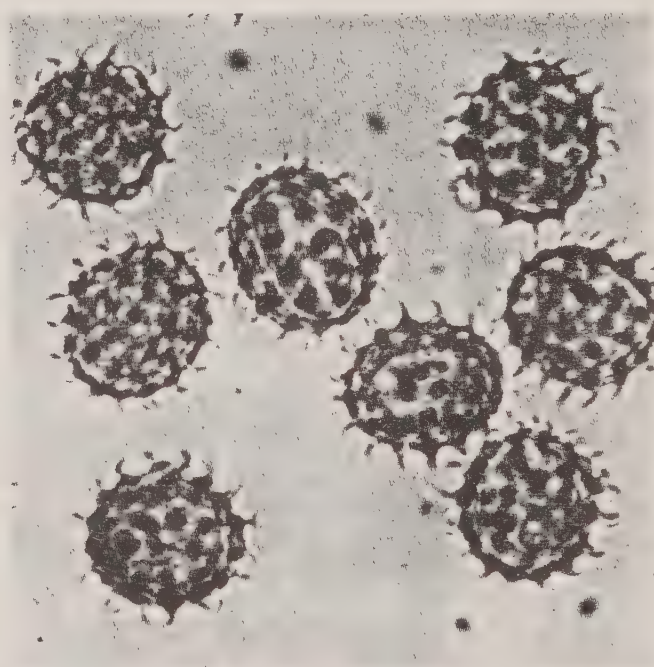
differences given by electron and polarised light microscopes. Anyone wishing to contrast the two methods can quickly assess picture evidence by viewing the two volumes side by side and although first impressions might favour SCANNING ELECTRON MICROSCOPE evidence the system choice depends on how deep one needs to go in analysis.

Perhaps it would be easier to say 'Don't use a sledgehammer to crack a nut'. This might sound unscientific but is valid since research via an electron unit is more expensive than research by a conventional microscope, but this assumes an acceptable answer from each method. Photographic records from the two systems show electron derived images to be superior in definition and depth of field and in the maintaining of these qualities at magnifications beyond the range of conventional microscopes. Volumes V and VI demonstrate this very clearly in the first section where illustrations of pollens from Acacia, Firebush, Hemlock, Marigold, Privet, Willow and Sunflower show striking patterns of regular form. These pollens range in longest dimension from 25 to 55 μm and are in most cases easily recognised in a conventional microscope.

With relatively large particles (pollens) the total picture of the particles may be all that you require but if for example a deeper study is required on the size and structure of the spines of Sunflower pollen then the Electron microscope can supply close detailed information. Picture No. 649 in Vol. VI shows the spines to be around 1 to 5 μm in length. The disposition of the spines and their forms are easy to see and are reproduced here to reinforce the argument from a comparative standpoint.



OPTICAL POLLEN



SEM POLLEN

So much for particles that can be recognised by optical or electron assistance but what about chalk, iron oxide or paint. The photo evidence on paint pigments in Vol VI shows that there is in some cases a difficulty in identifying one pigment from another by

SCANNING MICROSCOPE photo evidence alone. For example Winsor Violet and Burnt Umber look very similar but the same pigments under the POLARISING LIGHT MICROSCOPE look very much as you would expect them to look by colour. Proponents of the SCANNING ELECTRON MICROSCOPE principle would argue that the analytical accessories of the SCANNING ELECTRON MICROSCOPE allow for accurate chemical analysis of the visual evidence so that while the evidence might be difficult to translate by eye it is at least chemically identifiable by Energy Dispersive (EDXRA) or Wavelength Dispersive (WDXRA) X-rays.

Having just completed a neat identification of integrated carbon and aluminium particles we* can vouch for the analytical facilities of the SCANNING ELECTRON MICROSCOPE. But we have to admit that the ground work was made on optical microscopes equipped with polarising and phase contrasting attachments which were used to track by comparative means the links between carbon and metal particles and the plots of their distribution curves. The major point of this project was that it was only possible to explore the connection between carbon and aluminium via the WAVELENGTH DISPERSIVE SYSTEM of analysis on a SCANNING ELECTRON MICROSCOPE and the particle pictures shown by conventional optics. The overall analysis via both methods provided positive quantitative and qualitative results.

An intriguing fact stemming from this work is that the methods used for sample collection do not appear in Vol VI of the Particle Atlas. The reason for this is that we stumbled across someone who had been experimenting alone in a different but related field of hydrocarbon analysis and found a ready made technique to link with our own method of particulate capture. The technique has yet to be published and information on this will be given in a later issue of this magazine. In the meantime anyone wishing to talk about the subject should contact the Society.

The subjects and techniques in this latest McCrone 'Tour de force' are as follows:—

I. Advances in Electron Optical Methods of Particle Analysis; II. Identification of Sub-micrometer Particles; III. Some Techniques for Handling Particles in SEM Studies; IV; Descriptions and Electron Micrographs; V. Asbestos Identification by Electron Microscopy; VI. Use of Automation in Laboratory Instrumentation; VIII. Literature Survey; Index for Volumes 1—VI.

The Editors and Graphic Designers have maintained a quality that seems now to be a McCrone Hallmark. However, one criticism that we found difficult on the initial reading was the stop — start effect of reading texts that seemed to us to be loaded with abbreviations. But don't let this put you off. The second reading we found much easier and the third commonplace. The comments made in the Vol V Review regarding the quality of the writing and the treatment of the subject apply to this latest work but a point that should be emphasised about the whole series of Atlases is that they are an elegant solution to a researcher's need for 'fingerprints' and concise readable information.

*Thermal Control Co. Ltd.

Alan Goldsmith

INTERNATIONAL NEWS

An IUAPPA publication

5th INTERNATIONAL CLEAN AIR CONGRESS

The 5th International Clean Air Congress was held in the Centro Cultural General San Martin, Buenos Aires from 20th - 25th October 1980. Some 500 delegates from 32 countries attended and about 420 papers were accepted for presentation, although some authors were unable to present their papers personally. A few papers were presented at plenary sessions, but the vast majority were given at the Technical Sessions, five of which were held simultaneously each day, except Wednesday. Wednesday was the day of the national census and as a result all Congress activities had to cease for 24 hours. In the event, most delegates used the day to see something of the countryside around Buenos Aires.

There were a number of new departures at this Congress. The fact that there were more plenary sessions than at previous Conferences was welcomed, but care must be taken in future Congresses to ensure plenary sessions are not held simultaneously, as it can cause delegates to miss the presentation of some important papers. A new successful idea at Buenos Aires was the introduction of "round tables" to discuss contentious subjects. These sessions were not as well attended as they might have been, but this was probably because in every case the round table was held at the end of a very busy day.

The Congress secretariat are to be congratulated on the work they did in preparing a very comprehensive report of the week's activities for presentation at the closing session. This served as a very useful reminder of all that had gone on and of the many important subjects which had been discussed. Unfortunately it was not realised by the vast majority of the delegates that this report would form the basis for the formulation of a number of recommendations and resolutions. Nor were these recommendations and resolutions made available to delegates in advance. As a result, nearly everyone was taken by complete surprise and although the organisers were very hopeful that the recommendations and conclusions which they postulated should be endorsed by the delegates, most delegates were not in a position to do so and this had to be made very clear to the organisers.

The highlight of the social programme was the visit to the ballet "Swan Lake" and Reception by the Mayor of Buenos Aires, Brigadier Cacciattore, in the very fine Colon Theatre.

AUSTRALIA

Lead Free Petrol for New South Wales by 1984

The New South Wales Government has announced it intends to introduce legislation which will require all New South Wales service stations to have lead free 92 RON petrol available for sale by the first of July 1984. No other Australian States are contemplating similar moves, so since parts of New South Wales are supplied from other States there will be logistical problems for the oil industry.

Current exhaust emission standards general throughout Australia are similar to those applied in USA from 1975 and do not require the use of catalytic converters. However, the New South Wales Government is expected to toughen up its emission regulations to the level of US 1979 approximately about 1988, and this will require car makers either to prepare two types of emission controls, one for New South Wales and one for the rest of Australia, or to supply catalytic converters throughout Australia.

The introduction of lead free petrol is based on a perceived need to lower atmospheric concentrations of lead for health reasons. At present in New South Wales 97 RON petrol may contain up to 0.4 g/l of lead alkyl and sale of this grade will not be terminated.

R.W. Manuell

CANADA

Additional Funds Allocated to Acid Rain Programmes

The Canadian Minister of the Environment has announced that Canada's Government will spend \$41 million between now and 1984 to combat acid rain.

In a speech presented before the National Conference on the Environment held in Toronto on the occasion of Canadian Environment Week, Mr Roberts said that the Canadian Cabinet had approved the joint submission of three government departments to launch a comprehensive scientific, engineering and socio-economic research programme to design strategies to control acid-causing pollutants, to lessen their adverse effects and to protect the fisheries resource in Canada. Besides Environment Canada, the Departments of Fisheries and Oceans, and Health and Welfare, will participate in the endeavour to stop acid rain. The resulting knowledge is also required to substantiate Canada's position in seeking cooperative action from the United States.

These activities are in addition to on-going research by the Departments of Energy, Mines and Resources and Agriculture Canada into other potential areas of acid rain impact.

Environment Canada alone will devote \$7.5 million to its acid rain programme in 1980-81, as compared with the \$4 million originally earmarked for that purpose.

REPUBLIC OF CHINA

Taiwan's thriving economy has brought air pollution problems in its wake, especially in the major cities of Taipei and Kaoshung where automobiles and industry are major emitters. The authorities, anxious to avoid the serious and sometimes tragic pollution episodes experienced by many advanced countries, are deeply concerned about the control of air pollution.

Several steel works in the Song Shan district of Taipei City, which emit particulates at levels exceeding the required standard, have, after refusing to pay the due penalty for a whole year, now submitted to the authority of the City Government. Factories have been re-sited in other, rural areas, and the quality of the air at the former sites has already improved.

Automobiles are the main source of air pollution in Taipei while in Kaoshung industry is the major problem. Action to control automobile emissions is now underway and imported as well as locally produced automobiles have to be inspected. Motor vehicle regulations require that, in idle condition, emissions of CO (% by volume) must not exceed 1200 ppm.

Industrial Zones are now being planned in order to reduce air pollution to a minimum, and factories in Kaoshung are under pressure to consider renewing or resiting plant.

The resolution of environmental problems lies in a compromise between the need for economic growth and the demands of the public for higher environmental quality. Taiwan hopes, by the measures already adopted, and those planned for the future, to show that this balance can be achieved.

Lu Chau Yen

DIVISIONAL NEWS

EAST MIDLANDS DIVISION

Resignation of Chairman

Cllr. J.E. Hall of Peterborough City has tendered his resignation both from the Chairmanship of the Divisional Council and as a Peterborough Representative, due to changes in his work which precluded him from attending meetings for the time being.

In the absence of either precedent or constitutional guidance, Mr C.W. Stacey, DFC, Vice Chairman of the Division was asked to take over as Chairman for the rest of the year. This has been approved by the Council of the Society, with thanks to Mr Stacey. The Secretary has also written to Cllr. Hall, expressing regret and recording the thanks of the Division.

*E.F. Raven,
Hon. Secretary.*

NORTHERN DIVISION

Forty-seven members of the Northern Division attended a meeting held on 7th November at the Civic Centre, Newcastle upon Tyne. After the normal Divisional business, the members enjoyed an interesting and informative talk, "The Future for Coal" by Mr D.H.J. Catchpole, Deputy Marketing Director for the North East Region of the National Coal Board.

He commenced by stating that out of the 125 million tonnes of coal produced nationally, 16 million tonnes was obtained from the North East annually, approximately 3½ and 2½ million tonnes of this being shipped out of the Tyne and the Wear respectively and a further 2 million tonnes passing through the port of Blyth. Mr Catchpole explained that it took many years for a modern colliery to achieve its potential and it was not possible to increase or reduce production at short notice, which was one reason for the stockpiles of coal in some areas at present.

Mr Catchpole showed a slide, prepared from information supplied by N.I.F.E.S., which indicated the cost per useful therm for coal to be only 17p. compared to 26p. per therm for gas and 40p. for oil. He believed that the National Coal Board may have erred in the 1950's by pursuing a policy of producing solid smokeless fuel rather than working on the design and production of small combustion appliances capable of burning coal smokelessly. Mr Catchpole was convinced that the new generation of smoke-eaters would prove to be highly satisfactory and together with the development of fluidised bed combustion for industrial purposes, presented a bright future for the coal industry.

Questions were asked of Mr Catchpole on the future of Homefire, the type of appliances used to calculate the comparative cost per useful therm for various fuels, the minimum size of appliance capable of using a fluidised bed, the inability of people to operate the current crop of small domestic coal burning appliances smokelessly and the future of oil and gas from coal.

Mr Catchpole, with the assistance of his Technical Adviser, Mr A. Strong, answered the queries raised and was thanked for his talk by Mr L. Mair, Vice-Chairman of the Division.

C.R. Cresswell
Hon. Secretary

YORKSHIRE & HUMBERSIDE DIVISIONAL MEETING

The Minor Hall, Unity Hall, Westgate, Wakefield

Wednesday 18th February 1981 at 2.15 pm.

"ENVIRONMENTAL PROBLEMS ASSOCIATED WITH OPEN CASTING"

Papers presented by

G.R. Millington	Principal Asst. E.H.O. (Pollution Control) and
J.R. Jackson	Scientific Officer, both of Wakefield M.D.C.

An open meeting of particular interest to environmentalists,
planners and industrialists.

Enquiries to: Mr W.B. Twyford, Hon. Secretary
Municipal Buildings, Pontefract, Yorkshire. Tel Pontefract 72383

EAST MIDLANDS DIVISION

A meeting of the Division was held at the North Leicestershire Miners Welfare, Margaret Street, Coalville on Thursday 4th September, 1980 by kind invitation of the National Coal Board and the N.W. Leicestershire District Council.

The first speaker was Mr. John Robertson, Area Opencast Manager, National Coal Board, and his subject was 'Opencast Mining Methods and their effects on the Environment'. Mr Robertson outlined the operation at Coalfield Farm in the village of Heather, where over a period of four years 4 million tons of coal had been won from 240 acres of land at the rate of a million tons per year, with the result that the particular operation was nearing completion so far as the extraction of coal was concerned. The site had been worked from south to north, approaching nearer to the built up area as the operation proceeded. The Open Cast Executive had a Technical and Administrative function, the operations on site being carried out by Civil Engineering Consultants. Although operations started in 1976, planning considerations went back to 1970 and prospecting, which had involved some 650 boreholes, even earlier than that. The initial interest of the Coal Board had been greeted with some concern especially by the people in Heather.

Fears had been expressed at the planning enquiry about loss of visual amenity, noise, dust, blasting, mud, whether the river could be diverted successfully. The Inspector had recommended the project to the Secretary of State for Energy but subject to environmental clauses, with the result that the authorisation given in 1974 was with conditions.

With the output at 20,000 tons of coal per week transport by road would have called for 220 lorries, giving 440 vehicle movements. A survey showed 2,500 – 2,600 vehicles per day using the road and the additional number of movements was considered unacceptable. Hence the coal was taken the first 2½ miles by a series of overland conveyors along the line of the disused Coalville to Shackerstone railway. Conveyance is then by rail from the South Leicestershire Colliery.

The scale of operations on the site was to remove 4 million tons of coal in four years with an overburden ratio of 5:1. This meant there were 18 million cubic metres of material to be handled and the plant required was very large. Large caterpillar motorised scrapers were used followed by a walking dragline.

Since electric draglines are quite quiet in operation it was planned to use the dragline 24 hours a day and a 20 foot high embankment was raised with a shallow batter on the residential side. Disposal arrangements were made in a former sand quarry. There was a limitation of 445 feet above O D for coal stocks.

At the enquiry stage the Inspector had drawn attention to noise and had said that the NCB should have regard to the Wilson Committee report and that levels should not rise more than 10 dB(A) above the ambient levels. Two sectors were delimited – one at 440 yards from the dwellings within which working was limited to the hours 7am – 7pm Monday to Friday and 7am – 2pm on Saturdays. No night time working was permitted to the south west of this line. Outside the line there were fewer restrictions.

The contract contained a clause indicating that there should be no nuisance from dust and also specified that haul roads should be watered. Bowsers used could discharge 40 tons of water in 20 minutes and took 6 minutes to fill. There were also back-up bowsers. Fortunately the inherent properties of the overburden were such that there was no general dust nuisance.

There had been no blasting to date. The figure of 50mm/sec laid down in the U S Mines Bulletin would be used as the criterion.

Some supplementary information on the planning aspects and the after use of the site was given by Mr A. Godfrey, Member of the Executive for Planning Purposes, and both Mr Robertson and Mr Godfrey answered questions from the floor at the end of the talk. Diagrams were also available to show how the opencast operation had been carried out.

The meeting was then addressed by Mr Barry Evans, Manager of NCC (Rexco) Ltd., Snibston Plant, on 'The Environmental Aspects of Smokeless Fuel Production'. Mr Evans defined the manufacture of smokeless fuel simply as the lowering of the volatile content in coal. This could be done by batch production in which a retort was filled, heated to drive off the volatiles and then discharged, or by continuous coking in which the retort was never emptied. There was a liability to noise, dust and smell.

Thirteen years ago Rexco had decided that they wanted to be more in the Midlands and the coal at Snibston had been of the correct rand and swelling number. The plant set up had been of the continuous manufacture type. Earlier methods had relied on externally heated retorts but these had resulted in overcooking at the outside and undercooking in the centre. Also 40 tons of hot carbon had to be quenched and when the hot retort was recharged the coal flashed off.

The new system relied on retorts 30' high and 15' diameter at the centre tapering to 12' at the top and bottom. The problem was to get the material out and the coal in without venting to atmosphere. This was done by a series of hoppers and slide valves, but on every charge there was a certain loss of gas. The product drops through a downpipe to a bath and the head of water is such that the gases cannot escape. The plant includes a multi-tubular condenser with 400 vertical tubes in which there is water, the gas passing along the outsides of the tubes. The gas passes to a gas booster and a secondary tar drop catcher. Heating of the retorts is by a combustion chamber where the gas is burned. Coal is carbonised at 720°C and the flame temperature is 1300°C. It is essential to ensure reducing conditions since the presence of free oxygen would result in burning the retort — and no smokeless fuel. The product at 720°C must not be taken direct to the water since the resultant stress would cause the product to degrade.

Problems with the process can arise in the form of smell, noise, dust and explosion hazard. 250,000 tons per annum of coal has to be brought in since only 25% of local coal is now used due to the metallics and the hards and brights which give the product the appearance of coal and make it unattractive to the housewife. All the domestic production goes straight out but there is a 6 acre stock area for industrial fuels. These are the beans ($\frac{3}{4}$ " — $\frac{1}{4}$ "), and less than $\frac{1}{4}$ ", which is known as breeze. Much of this is exported and is used especially in the ferro silica industry.

Smell may arise from escaping gas or from fumes which evaporate from condensibles in the circuit. There is a cooler on site to reduce the water temperature from 120°C to 65°F. The condensibles have to be collected and the collectors are fitted with seal pots which can sometimes blow due to back pressure. After his talk, Mr Evans answered a number of questions from members.

*E.F. Raven
Hon. Secretary*

SOUTH & MID WALES DIVISION

On the 5th September 1980, the South and Mid Wales Division held a one day Seminar at the South Glamorgan Institute of Higher Education, Cyncoed Centre, Cardiff. The theme for the Seminar was "Clean Air for the 1980's", and invitations were extended to the Royal Town Planning Institute, Society of Public Analysts, Student Environmental Health Officers, and representatives from Non-Member Local Authorities throughout the Division. Some sixty persons attended the Seminar and the following is a precis of the various Speakers' addresses.

The Role of the Local Authority in "Clean Air for the 1980's" — address given by Mr. D. White, Lecturer in Environmental Health at the South Glamorgan Institute of Higher Education

This paper concentrated on the possible effects of public spending cuts and unemployment upon the standards of environmental pollution control. In particular the Speaker envisaged a situation where industrial development could be promoted by Local Authorities at the expense of environmental considerations. Often, it would be necessary to accept that a development would proceed in spite of objections. It would then be for the environmentalists to reduce its affect on the community to an acceptable level. This could only be achieved by a truly co-operate planning approach and by close attention to basic pollution control principles at all stages of the planning process.

So often Environmental Health Officers in Local Authorities are forced into a situation of trying to "shut stable doors after the horses have bolted". This was usually at much expense to all concerned. It would be so much easier and cheaper for all pollution control aspects to be incorporated prior to the construction stage. Consideration and co-operation is therefore required on all sides.

The Role of the Alkali Inspectorate in the "Clean Air for the 1980's" address given by Mr. R.J. Perriman, District Alkali Inspector

The Speaker divided his talk into two main parts - the Political, Legislative and Organisational Developments that would affect the Inspectorate and how its work may be modified and secondly, Industrial, Technical and Scientific Developments relevant to industrial air pollution and how they will affect the work of the Alkali Inspectorate.

Mr. Perriman referred to economies which could cause reductions in a small Inspectorate staff and hence limits on expenditure may result in reduction of the frequency of inspection. He referred to the proposed new Schedule of Works and that the fact that the main effect of these proposals would be to give additional responsibility to the Alkali Inspectorate in respect of asbestos works, lead works and cold blast cupolas. Reference was also made to the possible final demise of the Alkali Act and its replacement by some form of Regulation/Orders under the Health and Safety at Work Act. There is also a possibility that Air Quality Standards or Guide Lines could be introduced as are now being contemplated for sulphur dioxide and smoke in accordance with the E.E.C. Regulations and more guide lines can be expected in the future for other pollutants. The establishment of such controls would introduce additional factors to take into account when planning developments.

Consultation at planning control stage between the various planning authorities and the Inspectorate is a regular occurrence and these consultations also served to ensure

that the Inspectorate could make a significant contribution to the air pollution aspects of any environmental impact assessment studies being under-taken. The recent announcement of Enterprise Zones had caused much concern in respect of planning control.

The best practicable means approach has in recent years come under attack from critics who would prefer a more regulatory system with many numerical controls. However, there have been many signs recently that Countries employing such systems are beginning to realise the difficulties of application and are tending to move to a best practicable means type of approach. Further there has been increasing concern over the invisible and odourous emissions from various chemical works handling toxic substances. Tighter control of such emissions and the need for reassurance for the public will result in the development of more sophisticated measuring and monitoring systems.

There appears to be a continuing need for more open Government and this would result in the Alkali Inspectorate increasing its contacts with Local Authorities, Work Staff and members of the public.

The Speaker referred to the developments of various new processes in the field of coal processing, waste treatment and oil developments. There would appear to be a continual need for the Inspectorate to guard against adverse pollution effects arising from measures designed to improve fuel economy of existing furnaces. Further, long range transport of pollutants and acid rain is always something that is a matter of increasing concern and would appear to be so throughout the 1980's. Damage to aquatic life in fresh water systems in Scandinavia and Canada has already caused serious concern. The Alkali Inspectorate can be expected to be involved in such debates at all levels.

In conclusion, while the future of the Inspectorate may be somewhat uncertain in organisational terms, the Speaker illustrated that there is much useful work for the Inspectorate to undertake throughout the 1980's. Co-operation between the Inspectorate, Local Authorities, registered works, and members of the public is essential at all stages to try to ensure that emissions from such problem processes are kept well within the guide lines.

The Role of the Industrialist in "Clean Air for the 1980's" by Mr. H. Fuller, Esso Research Centre, Abingdon

The Speaker from the Industrialist's point of view started by reminding the audience that industry existed to provide goods and services.

However, because nothing could exist without having some impact on its surroundings and because industry had to be located in somebody's parish, industry needed always to be aware of its potential for affecting the environment.

Mr. Fuller said that industry could not ignore the quite proper public concern in the 1980's for environmental protection and the proposed E.E.C. rules on environmental impact assessment were consistent with this. He acknowledged that many large industries were able to afford special expert staff for such work, but suggested that smaller firms could make use of various trade associations or consultants, and a constructive relationship with the Local Authority was always mutually beneficial.

It was not sensible to shunt the job of environmental protection into separate

departments and forget it; it was important for all managers and all employees to be involved. Quoting the Factory Inspector's recent report, Mr. Fuller pointed out that a good attitude to the environment was usually a sign of good management all round. Because equipment to control emissions was generally costly, industry was naturally cautious about new investment. Mr. Fuller believed that fore thought by industry and reasonableness from control authorities, who should not impose a control "just to be on the safe side", could avoid waste and needless handicaps for industry. Industry had to operate "in the black" if it was to survive and maintain employment but it should also be a good neighbour to the limit of best practicable means.

T. Jones
Hon. Secretary

THE SOCIETY'S SECRETARY GENERAL

On 15th December 1980, Rear Admiral P G Sharp, CB DSC, left the Society after thirteen years of service as Secretary General. Admiral Sharp came to the Society after a distinguished career in the Royal Navy, and his background of technical knowledge and command, together with his grasp of essentials, have made him a formidable proponent of the Society's cause. His own abilities, and the experience and knowledge acquired during his years with the Society, have enhanced the standing of the NSCA, both nationally and worldwide.

Admiral Sharp was a member of the Working Party and co-author of the official UK report, "Pollution: Nuisance or Nemesis" written in 1971-2 in connection with the UN Conference on the Human Environment (Stockholm 1972). In 1972 he chaired a government Working Party on making public better information on industrial emissions to the atmosphere (the so-called "Indemat Committee"). A large part of the Sharp report was later adopted in the relevant sections of the Control of Pollution Act 1974. Appointed a member of the Clean Air Council in 1968, he co-authored the Council's 1972 Report investigating domestic smoke control in the North East of the UK. He was made Chairman of the Steering Committee of the Clean Air Council in 1974, which role he continued until the Council was suspended by the Government in 1979.

In 1973-4, Admiral Sharp was co-author of the study on "Energy and the Environment" set up jointly by the Royal Society of Arts, CoEnCo, and the then Institute of Fuel. As a member of CoEnCo from 1968 until his retirement, he has chaired their Energy Committee and been a member of their Pollution and Finance and General Purpose Committee.

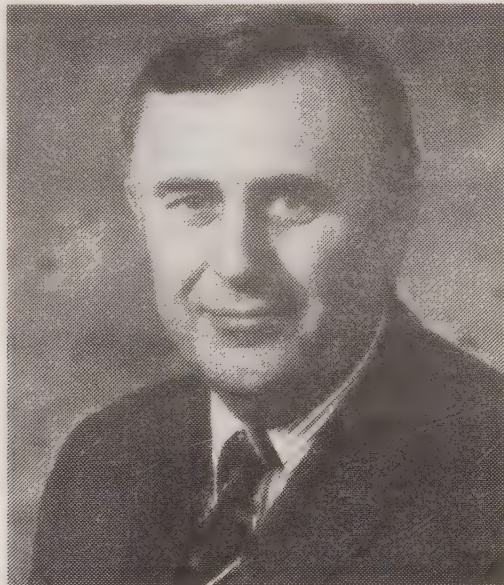
Admiral Sharp has, over the years, written numerous articles and editorials in the Society's journal, *Clean Air*, and has also been the author of various papers on clean air and the environment presented both in this country and at international conferences overseas. He has worked particularly hard for international understanding on clean air matters and the establishment of the International Union of Air Pollution Prevention Associations (IUAPPA) on a permanent basis. He subsequently became the Director General of this organisation, a post he still holds.

The Admiral's many friends within the Society will see him go with great regret but with the very best wishes for the future.

THE SOCIETY'S NEW SECRETARY GENERAL AIR COMMODORE JOHN LANGSTON, CBE.

Born in Dawlish, Devon in 1924, Air Commodore Langston was educated at Hele's School, Exeter and entered the RAF in 1942 through the Oxford University Air Squadron. After training in Canada he served as an Air Navigator in Bomber Command from January 1944 until the end of the war and in Transport Command until 1947. In 1948 he qualified as a Navigation Specialist and spent the next 10 years in associated Research and Development and instructional posts. He graduated from the Staff College in 1958 and served briefly in the Air Ministry before returning to the Staff College on the Directing Staff. In 1962 he was appointed CO of No. 49 (Bomber) Squadron. His next post was on the Defence Planning Staff of the Ministry of Defence and in 1967 he was appointed RAF Instructor at the Army Staff College, Camberley. On promotion to Group Captain in 1970, he served as Principal Staff Officer to the Deputy Supreme Allied Commander Europe, and was subsequently appointed CO of RAF Aldergrove/Senior RAF Officer Northern Ireland. In 1975 he became Director of Personnel Services (RAF) with the rank of Air Commodore. His final tour of duty before retiring was Air Commander Gibraltar.

Air Commodore Langston is married and has a daughter aged 27 and a son aged 25. He was appointed a CBE in 1975 for services in Northern Ireland.



Air Commodore John Langston, CBE, FBIM

Firstly I would like to say how delighted I am to have been appointed as Secretary General. Taking on the mantle of Rear Admiral Philip Sharp will not be easy, and I am acutely aware that my knowledge of clean air is as yet rudimentary. Thank goodness, therefore, for the experience of our talented staff which, hopefully, will keep me pointing in the right direction.

I have for long been interested in the environment although, as a Devonian, I grew up to take clean air for granted. Exeter, where I went to school, did suffer a unique combination of smells from a tannery, two breweries, a paper factory, a splendid gas works and its Wednesday cattle market — but I do not recall it as being other than a most tolerable place. Thus it came as a considerable shock in the winter of 1942 to find myself living in a Salford billet. I remember thinking how lucky it was that Air Force blue collars

could survive three or four days between washings. When, ten years and several tours later, I and my brand new American wife arrived in Doncaster at the start of another posting, her first comment was that she had never before seen black snow! I could only say that had she come from Pittsburgh instead of San Francisco she would have felt entirely at home. By the time of our next move, after two babies and several thousand clothes-line-blackened nappies, we had become ardent supporters of clean air.

So, I am very much looking forward to a productive and happy second career with the Society. I hope that it will not be long before I am able to meet members on their home grounds.

Air Commodore J. Langston

PETER SWIFT IS NEW CHAIRMAN OF FILTRATION SOCIETY

International Consultant on Dust Control, Peter Swift, BEng., CEng., FIMechE, is the new Chairman, for 1980/81, of the Filtration Society. Mr Swift, who has spoken at NSCA meetings and written for *Clean Air* on his speciality, dust control, was installed as Chairman at the Filtration Society's Annual General Meeting in Harrogate on Friday, 3rd October, 1980.

The Filtration Society will be holding a meeting on "Energy Conservation with Dust Control Systems", to be chaired by Peter Swift, in London on Tuesday, 17th February 1981. The meeting will start at 11 a.m. at the Cora Hotel, Upper Woburn Place, London WC1. Registration fee to include refreshments and lunch is £17 for members and £28 for non-members. Enquiries to the Filtration Society, 2 Woodstock Road, Croydon, CR9 1LB.

ENVIRONMENTAL PROBLEMS?

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SMOKE CONTROL AREAS

Progress Report Position at 30th June 1980

(Figures supplied by the Department of the Environment, the Welsh Office, the Department of the Environment for Northern Ireland and the Scottish Development Department).

	England		Wales		Scotland		Northern Ireland	
Smoke Control Areas Confirmed to 31.3.80	5,165	1,806,243	34	3,331	281	156,756	*80	19,411
Acres								58,516
Premises		7,549,559		10,754		640,372		
Smoke Control Areas Confirmed (1.4.80 - 30.6.80)	22		—	—	1	3,052	—	—
Acres		8,918						
Premises		33,392				1,159		
Totals	5,187	1,815,161	34	3,331	282	159,808	80	19,411
		7,582,951		10,754		641,531		58,516
Smoke Control Areas Submitted (1.4.80 - 30.6.80)	29	10,872	—	—	1	49	1	106
Acres								3,131
Premises		60,994		—		501		
Grand Totals	5,216	1,826,033	34	3,331	283	159,857	81	19,517
		7,643,945		10,754		641,832		61,647
Smokeless Zones (Local Acts) in Operation	44	3,400	—	—	—	—	—	—
Acres								
Premises		41,060		—		—		—

* N.B: Ballymena BC No. 2 SCO was revoked 1 April 1980; hence reduction of 1 (from 81 to 80 in Smoke Control Orders (Northern Ireland) confirmed prior to 1 April 1980).

NEW SMOKE CONTROL ORDERS

The lists below are supplementary to the information in the issue of **Clean Air (Vol. 10, No. 4)** which gave the position up to **31st March 1980**. They now show changes and additions up to **30th June 1980**.

Some of the areas listed are new housing estates, or areas to be developed for housing. The total number of premises involved will therefore increase.

The list of new areas in operation of smoke control is based on the plans submitted to the Department of Environment, but may erroneously include some local authorities who have made postponements without notifying the Ministry of the fact.

ENGLAND

NEW SMOKE CONTROL ORDERS IN OPERATION

North West

Oldham No. 34 (Oak Street/Shawside).

Yorkshire & Humberside

Leeds No. 8 Morley (East and West Ardsley).

West Midlands

Wyre Forest No. 3.

South East

Gravesham No. 5.

NEW SMOKE CONTROL ORDERS CONFIRMED BUT NOT YET IN OPERATION

Northern

Gateshead No. 15; Hartlepool No. 35; Langbaugh No. 8. (Redcar, Lord Street, East); Sunderland No. 19 and No. 20.

North West

Blackburn No. 20; Manchester (Collyhurst

Street Extension) and (Change of status of Smokeless Zones); Tameside (Longdendale No. 2).

Yorkshire & Humberside

Barnsley No. 29 (Darton), No. 33 (Staincross), No. 34 (Staincross), No. 35 (New Lodge) and No. 36 (Hoyland).

West Midlands

Newcastle-under-Lyme No. 11; Wyre Forest No. 5.

East Midlands

Bassetlaw (Worksop Area No. 8) (Kingsway); Blaby No. 13 (Glenfield North); Chesterfield No. 12 (Hasland & Spital).

South East

Gravesham No. 6; Milton Keynes No. 6.

London Boroughs

Hillingdon No. 40.

NEW SMOKE CONTROL ORDERS SUBMITTED BUT NOT YET CONFIRMED

Northern

Langbaugh No. 9 (Redcar Seafront); North Tyneside No. 19, No. 20, No. 21, No. 22, No. 23 and No. 24; South Tyneside No. 7 and No. 8.

North West

Liverpool No. 34; Manchester (Change of status of Smokeless Zones); South Ribble No. 11 and No. 12.

Yorkshire & Humberside

Rotherham (Wickersley).

West Midlands

Coventry No. 25; Dudley No. 141.

East Midlands

Bassetlaw (Worksop Area No. 8) (Kingsway); Chesterfield No. 13 (Old Whittington); Derby No. 34 (Babington and Litchurch); Gedling No. 8; Lincoln No. 18.

South West

Cheltenham No. 12 (Kings Park).

London Boroughs

Hillingdon No. 39 and No. 40.

SCOTLAND**NEW SMOKE CONTROL ORDERS
IN OPERATION**

Inverclyde District No. 1; Motherwell District (Gowkthrapple).

**NEW SMOKE CONTROL ORDER
CONFIRMED BUT NOT YET IN
OPERATION**

Nithsdale District (Annan Road).

**NEW SMOKE CONTROL SUBMITTED
BUT NOT YET CONFIRMED**

Motherwell District (Yett Farm & Whittagreen Farm, Newarthill).

**NORTHERN IRELAND
NEW SMOKE CONTROL ORDERS IN
OPERATION**

Belfast C.C. No. 15 and No. 16.

**NEW SMOKE CONTROL ORDER
SUBMITTED BUT NOT YET
CONFIRMED**

Craigavon B.C. No. 8.

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Reader Enquiry Service No. 8070

INDUSTRIAL NEWS

Reducing Vulcanisation Fumes

RAPRA (the Rubber and Plastics Research Association of Great Britain) is to initiate a new approach to the prevention of pollution in the rubber industry, based on compound reformulation and process control. Present methods for reducing fumes usually involve removal or dispersal, either by ventilation or by resiting of machinery. Both techniques may involve substantial cost and often do little more than pass on the pollution problem to somebody else.

RAPRA's new approach will be directed to the prevention of pollution at source, so that pollutants can be minimised, both during processing and during the working life of the product.

The techniques involved have been developed at Shawbury during five years of research into the nature and origin of vulcanisation fumes. Both laboratory experiments and small-scale industrial tests have indicated that these methods have a promising future.

RAPRA is now seeking companies to co-operate in developing these encouraging results to lead to full-scale industrial improvements. Representatives of organisations interested in this new approach to reducing factory pollution, and producing environmentally safer products can obtain further details from Jack Maisey, RAPRA Shawbury, Shrewsbury, Shropshire SY4 4NR, England. Telephone Shawbury (0939) 250383.

Reader Enquiry Service No. 8071

ICI Acoustics Silence Terephthalic Acid Plant

A splitter element is lowered into position in a large stainless steel 'off gas expander' splitter silencer to be supplied to ICI Petrochemicals Division by ICI Acoustics

as part of a noise control programme at the £90m TA8 (Terephthalic Acid) production plant being built at Wilton.

Designed in conjunction with ICI Agricultural Division, Noise and Vibration Section, the silencer is constructed of stainless steel, in this instance to a rigid manufacturing specification laid down by the main contractor Foster Wheeler Ltd. It measures 2m x 1.6m x 9.3m long, weighs some 3400kg and has an all welded, 5mm thick casing, strengthened by external ribbing along the entire silencer length. The sound absorbent splitters are housed in a 3.4m long central section of the case, which is provided with a separate flanged and bolted top cover for easy maintenance and access.

ICI Acoustics is one of the country's leading specialists in the field of industrial noise control and offers a comprehensive service both in remedial and capital project situations. The company is supplying other noise control equipment for the TA8 project in order to give maximum protection to both workers on the Wilton site and to the outside community.

Reader Enquiry Service No. 8072

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